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Experience in Training Mechanical Operators

Machine Tool Plant of Medium Size Succeeds in the Effort to Develop Efficient Workers from Ranks of Unskilled Men and Women

THE success of the large machine shops and munitions plants in training men and women to operate machines and to do some classes of assembling and inspecting is now well known. But many are the managers of smaller plants who have hesitated to undertake this work because of the

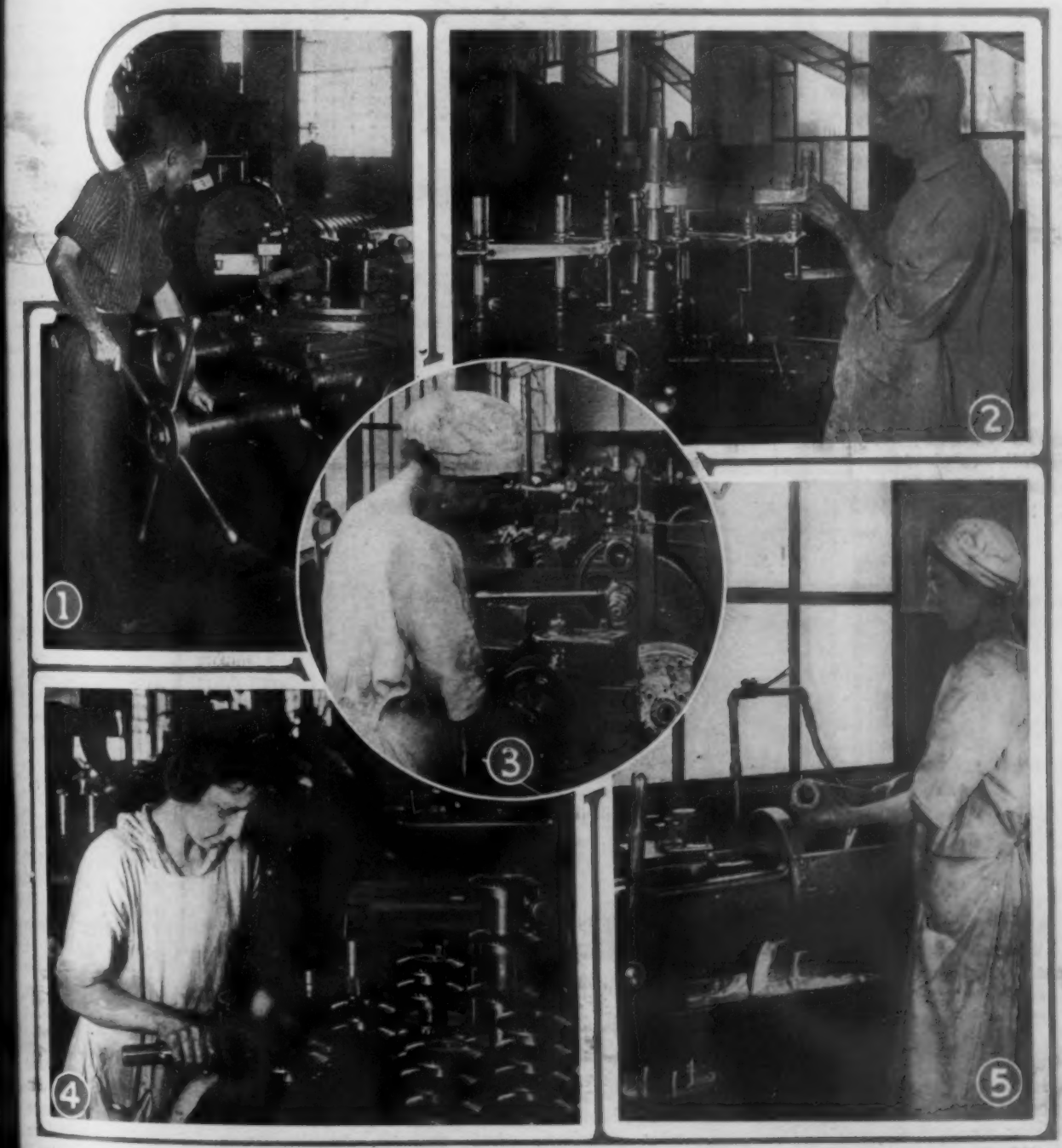


Fig. 1—A Carpenter Who Began Machine Work in January. Fig. 2—A 63-Year-Old Shoemaker On Caliper Devices. Fig. 3—Young Woman Began in June and Now Performs an Indexing Operation. Fig. 4—A 20-Year-Old Assistant Inspector Since April. Fig. 5—Broaching Parts Weighing 40 Lb.

lack of sufficient volume of repetitive operations. The success attending the establishment of a small training shop by the Blanchard Machine Co., Cambridge, Mass., manufacturer of a widely used vertical grinding machine, should give managers of other plants of medium size an inspiration to undertake this important work.

This work was first undertaken a few months ago, but the installation of a separate training shop with a few simple machine tools was made about two months ago. Since the establishment of the training shop the particular aim has been to develop women operators. The women have been taught to operate plain drilling machines (some with jigs and some ordinary layout work), broaching machines and engine lathes, and to do bench assembling and inspecting. The company is also successfully employing girls in the stock room and tool crib.

Most of the women have been over 25 years of age and several are married. At the start the women were secured from an employment agency, but of late the accessions to the force have been secured by the recommendations of the women workers and by applications made to the employment department by women who had learned that the company had established a training course. So far, 14 women have been trained and 11 have stuck to the work. Of the three two left, one said that she did not like the work, and the other two objected to the dirt and oil. The women operators wear either bloomers or aprons, as they choose. The women buy their own bloomers, but the company pays for the expense of laundering. The company furnishes aprons and caps.

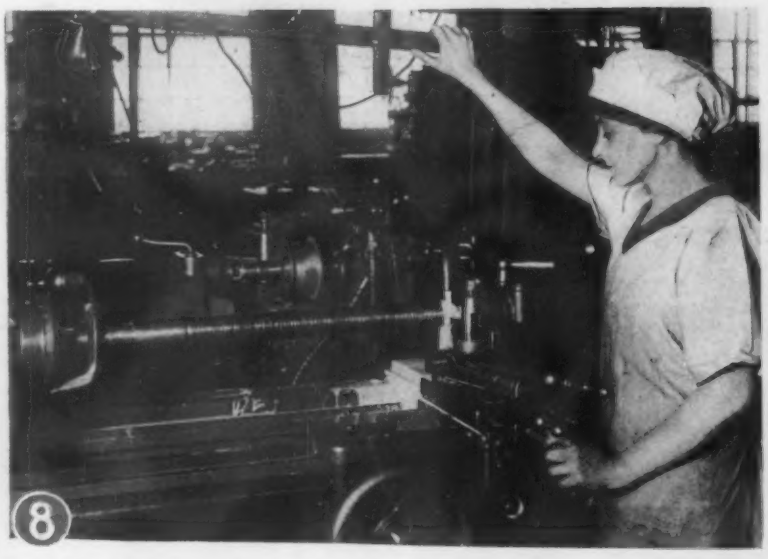


Fig. 6—Without Lathe Experience Before June Now Finish Turning Steel Bevel Gears. Fig. 7—Comparatively Simple Drilling. Fig. 8—Operator Who Began May 9, Now On Exacting Thread Cutting

For the benefit of the women workers the company has opened a special rest and lunch room. This room has good washing facilities, with hot and cold water, steel lockers, a gas range, table, comfortable chairs with one broad arm, and a mirror. This last is no inconsequential item, as any employer of women will testify. A good toilet room opens from this room.

No set time is allowed for the completion of the training course, but an effort is made to hold the women in training for a period long enough so that they will not require constant supervision and guidance by the foreman after they are put on productive machines.

The accompanying illustrations afford a good conception of the work that the newly trained men and women are doing. The company feels that the policy of establishing a training shop under a special instructor is justified by the results that are here graphically shown.

The man shown in Fig. 1 is a carpenter by trade, 36 years old, and entered the employ of the company Jan. 9. He had had no previous experience on machinery, but by placing him on work where there was an opportunity to do mostly repetitive work his output virtually equals that of a trained machinist. It will be noted that directly before the man's face in the illustration there is a small

slip of paper. On this slip of paper are two figures—one for the turning position of the cross slide and the other for the boring position.

For making fine measurements on the work being ground on the vertical grinding machines made by the company, it manufactures a special caliper device. This work is much like instrument work, and is being done (Fig. 2) by a man 63 years old, who, previous to taking up this work, in June of this year, was a shoemaker. In this short space of time he has learned to assemble completely these delicate instruments, making the proper adjustments, and doing some fine lapping, and the quality of his work is such that it passes a rigid inspection.

The graduating of segment plates which are part of the equipment of the Blanchard grinder is done by the young woman shown in Fig. 3. It calls for the use of an indexing head and for the making of every fifth line 3/16 in. longer than the other lines, using a gage shown on the front of the machine for that purpose. This operator had a small amount of experience assembling automobile starters before taking up this work last June. By setting up the machine for her, and not giving her too difficult jobs, she is able to equal the time of the average man on this work.

One woman has been an assistant inspector since April 29. In Fig. 4 she is shown inspecting bevel gears that have just come from the gear generator. If they do not run smoothly in the fixture shown she lays them to one side for final inspection by the chief inspector. She also inspects other components that can be tested by the use of go-and-not-go gages. She is only 20 years old, and while she does not understand all the technical phrases, there is a very large part of the work that is merely routine, and doubtful pieces can be referred to the chief inspector.

The woman shown in Fig. 5 is operating a No. 3 broaching machine on a variety of parts. The broach that she is holding in her hand is 48 in. long and weighs 40 lb. Speaking of this particular operator, Mr. Blakeman, the superintendent, said: "This work was so heavy that we rigged up a chain fall to enable her to do it without undue muscular effort, but the chain took a little longer time than it took to handle the work by hand, so she discarded the chain fall and handled the 40-lb. broach by hand until she was tired, and then went back to the chain fall to give her a chance to rest. This shows the spirit in which the girls that we have in our shop are taking this new work. Production on this work is equal to that of any man we have ever had on the job."

The finish turning of steel bevel gears to accurate dimensions is also done by a woman operator, Fig. 6. She is using a compound slide, and is producing a quality of work that passes the most critical inspection. The pose was not especially for the photographer, but is a natural one, and indicates the carefulness and watchfulness with which she does her work. She began work in June.

A comparatively simple type of jig drilling on a 20-in. upright drill press is shown in Fig. 7. Much of this work calls for drilling and tapping, as well as counterboring and spot facing. The women operators are able to reach the output of any except the most experienced men.

An operation requiring very careful attention and unusual skill is the thread-cutting operation (Fig. 8) on a feed screw. This feed screw is made from 40-carbon steel, is 26½ in. long, and has a ¼-in. pitch Acme thread about two-thirds of its length that must be a close fit in a bronze unit. The young woman operator, who has been on this work since May 9, is able to take these screws from the rough stock, turn them to grinding size, and finally finish-cut the thread in less time than was formerly taken by skilled machinists. This is the most advanced operator that the training in the Blanchard plant has yet turned out.

MUNITION INDUSTRIES

American and French Missions Inspecting Plants of the Two Countries

WASHINGTON, Sept. 3.—An American mission, sent by the Ordnance Department, is to study French munition industries. After three weeks in Washington, the French mission of ordnance engineers is now touring the United States.

The French mission, which numbers six officers and engineers and 20 foremen and superintendents of French munition plants, was divided for the trip. Experts on shell production left for the shell plants; experts on gun production—field artillery and heavy artillery—for the centers where guns are being forged and machined and where the carriage and recoil mechanisms are being built; the experts on tanks, tractors and caterpillars left for the factories where this material is being produced.

Lieut.-Col. Martinon, head of the mission, went to Elizabethport, N. J. Before leaving Washington, Col. Martinon made the following statement:

"In the conferences which have taken place since my arrival with the committee which was formed by General Williams, we have considered in detail all questions relative to the production of ordnance. I would say that we of the French mission and our American conferees are in absolute agreement on all subjects.

"To supply the ever-increasing needs of both the American and French armies, production of certain items of material has yet to be increased. We rely on the manufacturers and on the workingmen of America to increase production—to out-do the magnificent work they have already done.

"We of the French mission are now setting out with Col. James L. Walsh, of the staff of the Chief of Ordnance, on a long trip to America's many great munitions plants that we may see on the spot the conditions of production. We would wish that the improvements which have been reached, either by France or America, in ordnance production should be made use of by either country.

"With this object in view, it is the intention of General Williams to send to France a mission of the same character as this of ours and which will aim to make known to the French manufacturers all improvements in ordnance production obtained by American manufacturers.

"Needless to say, such an American mission will be very heartily welcomed in France, and that welcome will serve to acknowledge the great kindness which General Williams and the officers of the Ordnance Department have shown us in order to facilitate our work in this country.

"America and France have no secrets one from the other as to the production of any ordnance material."

As the future progress of the Dominion of Canada depends largely on the development and use of all the available fuel-power resources, the government has formed a Dominion Power Board, comprising nine permanent officials of the various departments. The board has also been charged with the responsibility of coordinating all the investigation activities of the Government with regard to fuel power resources and of advising upon their development and use.

Aspects of the Indian Steel Industry

Technical Phases of Present Practice—High Manganese in Rails Advocated—How Best to Add Manganese—Basic Steel and the War

ANDREW McWILLIAMS, metallurgical inspector, Government of India, India Munitions Board, presented before the Iron and Steel Institute in London in May, 1918, a paper entitled "Technical Aspects of the Establishment of the Heavy Steel Industry in India, with the Results of Some Researches Connected Therewith." It is replete with many important metallurgical facts.

The author gives first an historical resumé of the establishment and progress of steel making in India. Until some little time after the war broke out, the staff of the open-hearth department of the Tata Iron & Steel Co. was German and not particularly skillful. Mr. McWilliams then goes on to say:

They favored running the heat down to a minimum carbon content and recarburizing with coke-dust. The coke-dust used with its high content of ash is not a good recarburizing agent, but the author tried several experiments and proved that when properly handled the method was capable of producing steel which, after rigid examination, showed no unusual signs of unevenness in composition, and passed with ease all the Indian State Railway tests for rails, including the drop test. As carried out by the Germans the method was not a success, and the losses from off heats, rejected heats, rejected rails, and other causes were so great that the closing down of the steel plant had, it was understood, been actually decided on. At this stage Sir Trevredyn R. Wynne, then president of the Indian Railway Board, asked the author whether he could put things right. Arrangements having been made he successfully put the Indian heavy steel industry on sound practical lines, and others then worked out the labor and commercial side, and got it on a good business footing before the war. Since then the profits have been sufficient to wipe out the cost of all past mistakes and to place the firm in a very strong position.

Cause of the Failure in Steel-Making

The main cause of the failure to produce commercially or even technically successful results was the lack of sufficient knowledge and skill to work the method they had adopted. They had no stage laboratory, and depended for their judgment of the composition of the bath on the usual sample ingot tests without analysis. They seemed to make little attempt to govern the nature of the finishing slag, which, to the author as a slag enthusiast, was one of their worst faults.

The author started to install his methods in August, 1913, had a stage laboratory erected at once, so that regular carbon and phosphorus determinations would show the progress of the elimination of these elements during the working of the heat instead of after the steel had been tapped, occasional sulphur determinations being also made. He decided that, with the low phosphorus content of the charge, the best method in which to train the men in the basic open-hearth process would be the comparatively new one of catching the carbon coming down, the amount of lime and oxide of iron used being so proportioned that the phosphorus would be sufficiently low when the proper carbon content was reached, and that the slag would also be in good finishing condition at the same time. Failure with the men available was prophesied, but by this time a young American of great energy, Lansing W. Hoyt, who believed that the author's methods were sound, had been given charge of the steel-making department, and he worked at the new process with great enthusiasm.

The Germans showed no sign of resentment, but on the contrary were anxious to pick up every point, understand it, and apply it. In a country new to an industry there is no reserve of skilled men to draw upon, and in introducing a different method it is necessary to train men specially to the new work. Young chemists had to be trained into the ways of a stage laboratory, and the melters to be impressed with the fact that the proper treatment of the sample for carbon analysis, though simple, was as necessary to the success of the final result as the more difficult features already shown to them. The result was entirely successful technically, both as to the proportion of heats that came within the limits of the specification, and to the percentage of rails rejected, mostly by the company's own inspector.

Effect of Method of Adding Manganese

The relative merits of the two main methods of adding manganese to the steel, in the furnace or in the ladle, have been the subject of many discussions. It will be admitted that the ideal method is to finish the steel, so far as practicable, on the hearth of the furnace; the addition of aluminum, and in the basic process, of ferrosilicon being necessarily made outside the furnace. The addition of ferromanganese in the bath entails an extra 20 per cent or so of loss of manganese, and for narrow limits and severe inspection as to figures it is not perhaps so easy to hit the manganese content as by adding the manganese in the ladle, although it is easier to hit the correct carbon content, but the author's experience is that the resulting steel, when the manganese is added in the furnace, is of superior quality, probably because the oxygen is more thoroughly eliminated.

Unless the addition of manganese and also of carbon in the ladle is done with skill and great care, the steel is apt to be uneven in composition, and after the most careful consideration, not forgetting the slight extra cost per ton of ingots, though not necessarily of rails produced, he decided from his past experience in the works to add the ferromanganese in the furnace for all higher tempered heats, such as rail steel. It was not thought worth the extra cost for ordinary structural steels to British standard and similar specifications. With manganese added in the furnace a larger percentage of rail heats stood two standard blows under the drop test than with manganese added in the ladle, the manganese left in the steel being the same in both cases.

The English melters when they arrived elected to add the manganese in the ladle, and as they were skilled men were allowed to do so, but in making by the basic process such specially tested material as high explosive shell steel, with men unaccustomed to armament work, and with American ideas of rapidity of working in the open-hearth and of temperature of rolling in the mills, it was found difficult at first, especially when ferrosilicon was scarce, continuously to keep both the yield point and the elongation safely above the minimum specified.

If the bars are to be hot-worked during the process of manufacture into shell, or if there are facilities for normalizing the output, there is no trouble with elongation, as it is easily brought up by normalizing, and so the yield point can be kept well up; but where the shells have to be turned direct from the bar with no facilities for normalizing, the test must be correct on the bars as they leave the mill.

Normalizing our output was quite out of the question. For the making of higher explosive shell steel under these conditions the author ultimately had the manganese added in the furnace, for he found that when added in this way the steel would stand a higher rolling temperature without seriously reducing the elongation obtained under tensile test, and he was thus able to keep the yield point higher to satisfy the military inspection authorities, and also to allow of higher rolling temperatures to facilitate output with these large rounds, which were required in the maximum

quantity that could be produced in a given proportion of the time of the works. The discard from these bars was in great favor, as it stood fire much better than the discard from bars made by the other method. Adding the manganese in the furnace has another advantage in that it almost insures finishing with a good slag.

High Manganese in Rail Steel Advocated

There seems a curious prejudice in government and other circles against high manganese in steel, that is, manganese up to 1 per cent or so, and specifications sometimes contain the proviso that manganese shall not be more than 0.70 per cent, as if it were a necessary evil, when it would be better if it were to be specified as not less than 0.70 per cent because of its beneficial effect on the steel. This is a question on which there seems to be still a genuine difference of opinion, the low manganese view being no doubt strengthened by the advocacy of Mr. Harbord, in his excellent book on steel, but that advocacy is one of the few things that the author would like to see changed in his authoritative work, as it would make easier the task of those of us who believe in higher manganese.

Manganese is a great cleanser of steel as to the portion that is oxidized out, and for rails and many other purposes up to 1 per cent or even a little beyond is beneficial, as to the portion that is left in the steel. Manganese has a fining effect on the pearlite, of which modern rails are very largely composed. One is sometimes met by the objection that manganese may be good for the steel, but that with high manganese it is difficult to pass the drop test. The British Standard; Indian State Railways, and Bengal Nagpur Railway drop tests are severe, and the author's experience with these tests during the last six years is that for the same temper as measured by the deflection under the first blow, and for the same method of adding the manganese to the steel, the high manganese rail stands the drop test best.

Average Composition of Indian Steels

Since the author put the method of manufacture on a proper basis there has been practically no trouble with phosphorus content, and there was never much trouble with sulphur, the average being something like 0.03 per cent of each. By the time the Germans were interned, English steel melters, mostly from Middlesbrough district, arrived. It was amusing to notice that for their first few days at work they seemed to attack the 0.40 per cent phosphorus with somewhat of the same vigor that they had attacked their 1.60 per cent at home, with the result that they produced a considerable number of heats at first with less than 0.01 per cent of phosphorus in the finished steel.

Th quality of the structural steel is excellent. Only a very small number of heats have had to be rejected, and these nearly all for being a little over or under the required temper. There is no trouble with elongation nor with sulphur and phosphorus contents.

Very few heats of rail steel have failed under the drop test. It is well known that the Indian State Railways require their British standard section flat-footed rails to stand only one blow. For 90-lb. rails the blow is of one gross ton dropped from 26 ft. on a 5-ft. piece of rail placed head upwards on supports 3 ft. 6 in. apart. By arrangement with the firm all test-pieces for 90, 75, 50, 41¼, 40, 35, and 30 lb. are given two blows, the second for information only. This was started in order to study the effects of various modifications in practice in steel-making, and has been continued all the time, for, as practically no rails break under the standard drop, the only information received from this test for the accumulation of general metallurgical knowledge would be from the deflection which, though not specified, was always measured. The British Standard drop for 60-lb. rails seems much more severe than the others mentioned, and so many of the higher-tempered rails break under the second blow that it is not given now, as affording very little information, and subjecting the apparatus to unnecessary strain. It would be well that this test should be recalculated by some mathematical engineer.

It was thought possible that the freedom from trouble with the drop test might be partly due to the high temperature at which the rails are tested during seven months of the year. On one day when the thermomenter was showing a maximum of 118 deg. Fahr. in the shade, a thermometer was laid on one of the rails and showed 154 deg. Fahr. To test the question, merely for information, test-pieces from some of the high-tempered rails were put into a pan, covered with ice, and tested when quite cold to the touch. These rails were perceptibly stiffer as shown by the deflection, but passed the specified test.

For those who specify two equal blows, and the measurement of deflection, it seems waste of time to require the deflection to be measured after the second blow, as that after the first blow shows the character of the rail, and the second generally gives just double the deflection minus a fraction of an inch, about one quarter, due to the stiffening effect of the first blow.

As the higher management of the works has been American from the first, it must be remembered that the standard American drop test to which therefore they were accustomed at the time of starting the making of rails in India was a blow of 1 net ton dropped 15 ft. or 30,000 ft.-lb. for 90-lb. rails, little more than half the Indian State Railways or British standard drop of 1 gross ton dropped 26 ft. or 58,240 ft.-lb.

Importance and Abuse of Inspection

The question of rejections by engineers and inspectors is one of national importance and will have to be given careful consideration after the war, as it has been during the war. Although there should be no relaxing of our aim at high quality, to keep up our reputation in the world, and therefore specifications must be strict, at the same time every article unnecessarily condemned is a dead loss to the community. The condemnation may be on mere figures that it is necessary to put on paper to form the basis of a commercial contract; but some of those condemned on these figures might do their work in the world even better than some that must be accepted. For example, take a common type of chemical specification for a rail where the temper might be defined as carbon 0.60 to 0.70 per cent; manganese, 0.50 to 0.80 per cent. A rail at carbon 0.60 and manganese 0.50 per cent would have to be accepted, but one at carbon 0.57 and manganese 0.90 per cent although out on both elements, would be expected by most people to do as good work as the other, and although the engineer has a perfect right, as in this case, to enforce his obvious preference for low manganese, and to insist on the great bulk of his material being to that pattern, if the inspector were sufficiently well trained metallurgically, he might be allowed, though not compelled, to accept a certain proportion that, although not liked generally by the engineer, would, according to very widely held views, do as good if not better work.

Where there are these almost diametrically opposed views, searching investigations should be made to settle the question. Every unnecessary restriction increases the cost of a material, the time required for delivery, and the quantity available. Fads have some use in peace times, or times of bad trade, in developing the skill of steel-makers to meet even unnecessary conditions, which might ultimately become necessary; but some of them are impossible to meet, or conditions are too rigid to be met economically even in the best practice, and must be taken round until a maker is found who has developed sufficient skill in evading conditions, thus making this carrier of temptations pleased with himself, which is all to the bad.

The preparation of bend tests so as to give the steel the best chance possible under the terms of the specification involved considerable unnecessary cost, so the bending of test-pieces of all sections as they were, that could be done by the machine, was introduced. As this test was too severe there went with it the promise that we would only pass on it and not reject. In the few cases that do not pass, fresh samples are taken and prepared in the best way allowed by the specification, and the heat is considered not to have any stain on its character. The same principle was adopted in doing away with means of measuring the internal angle of the bend, which takes time. The whole section is simply pressed down until the internal radius is well below that specified, and again the sample may be passed on this rapid

and severe test, but not rejected on it. The method has worked to the satisfaction of both sides and saves cost in preparation and time in testing.

Relative Wear of Basic Open-Hearth Rails

The question of the relative wearing qualities of rails of different types of compositions all within safe limits should be tried on a large scale on some home railroad where traffic is heavy enough to give results in a reasonable time. Through the interest of G. C. Godfrey, the agent; H. H. Jellett, chief engineer of the Bengal Nagpur Railway, and the author have had a trial set of various selected rails of Tata's make, and some English rails under test on a portion of the Bengal Nagpur Railway line where there is excessive wear. The compositions of all the rails and the results of the drop tests on all the Indian-made rails are known. As the tests have only been going on for two years it is too early yet to say anything definite, but already the results are interesting, and in another three years' time may be worth publishing. So far, the Indian rails are showing up well in comparison with their English competitors in the trial.

Specifications for Basic Open-Hearth Rails

The British standard specifications are so much used now that it is time there was one for rails made from basic open-hearth steel, which must be the main source of supply in the future. It is hoped that when the specification is made the committee will retain the high manganese requirements shown in their present specification, which was made more particularly for acid Bessemer rails.

The author's idea of a specification might be taken as a basis for discussion: Carbon, 0.50 to 0.60 per cent, with perhaps 0.03 per cent carbon lower for rails of 50 lb. per yard and under; manganese, 1 to 0.70 per cent; sulphur and phosphorus not more than 0.05 per cent each, and silicon to be left to the discretion of the manufacturer, the amount present to be stated—for flat-footed rails, the test-pieces to stand one blow, the same as in the present specifications, but with a reconsideration of the blow to be given in each case in order that the test may be of about equal severity throughout the table, and particularly to reconsider the drop test on the 60-lb. rail. If a measurement of deflection is specified a maximum should be sufficient without a minimum, and if a tensile test is recommended there should be a minimum tenacity only and no maximum with a minimum elongation.

Refractory Heads for Rail Steel Ingots

The only portion of the author's recommendations that the Tata Company for various reasons has not yet tried is the use of refractory heads for the ingots, and if possible casting big end up. He has made such calculations as he could without access to the company's books, but with special information as to rejections, and he feels sure that when circumstances admit of their being adopted the practice will pay even now, and by practically abolishing rokes and pipes in the rails will tend to the building up of a high reputation. His opinions were given in some detail in the *Journal of the Iron and Steel Institute*, 1915, No. I. pp. 74-75, in the discussion on the paper by Sir Robert Hadfield and Dr. Burgess.

Another advantage of the high manganese temper in a rail specification is that it facilitates the thorough killing of the steel, which is essential for the proper use of refractory feeding heads for ingots.

An important matter that does not seem to have been given the thought that it deserves is the nature and degree of the loosening of the bonds of a specification in times of war, which involves the very careful consideration of the relative values of the various parts of the specification as to which are necessary and which are only desirable. This is not an idea born of the war but represents an opinion that the author has long held. He even addressed his department on the point, in so far as it had reference to his own work, in November, 1913, before the war. As the very figures of specifications are apt to become fetishes worshipped for themselves, it ought to be remembered that the tests made are generally only attempts to get at the real thing by making measurements of certain properties of the steels. He feels strongly that experiments should be made in times of peace, and at least some tentative decisions arrived at as to the points that might be relaxed in times of great stress.

Analysis of a German Rail

There is a wealth of interest in other people's work in one's own line, so the analysis of a German rail captured at Bagdad is here given. Carbon, 0.45 per cent; silicon, 0.02 per cent; manganese, 0.90 per cent; sulphur, 0.050 per cent; phosphorus, 0.086 per cent.

One of the most fascinating duties of the office is the examination of rails and other materials taken up for various reasons, among others failure in use, but unfortunately the results are at present strictly confidential.

Personal

Things move rapidly in this "island" site in the midst of an enormous Indian jungle. The present holder of the office of Government metallurgical inspector in the six years since he landed in India at the end of January, 1912, has become the oldest inhabitant who has held a head position all the time. He has had to deal with four general managers in that time, and with the present one, T. W. Tutwiler, for over three years of it. Mr. Tutwiler and he have worked in complete accord during the whole of the time, and they intend to present a joint paper on the works practice at the present time before what are called the "great extensions" are made, when the output will be raised to nearly five times the original estimate of about 120,000 tons a year of steel. Among the others he has had most to do with mill managers, and the first was James Cave, who brought out the mill men, mostly from Cumberland. The next was F. K. Bennett from the Southern States, who, however, was born in Sheffield, and lived there till he was ten. Mr. Bennett having been made works manager, William Bamforth of Sheffield is the acting superintendent of mills, with the bar-mill under the care of Alfred Cave.

In the government department C. A. Irwin, trained at the University of Sheffield, and with experience in various works, came out with the author, and his special speed and accuracy in analysis stood us in good stead in the early days when differences most frequently occur. When he was required for the work of assistant metallurgist we had Aloke Nath Bose, who had been at the University of Birmingham, ready, and two other Indians, Phanindra Nath De from Calcutta and Bhabotaran Chakravarti, who is a product of our own training as an experiment. All three are skilful and reliable workers, and our laboratory has never once let us down. As inspection work increased R. C. Arbery, from King's College, London, joined us as assistant engineer, now assistant metallurgical inspector, and has been with us since.

Since March, 1917, the metallurgical inspector's office has been taken over by the Indian Munitions Board under the presidency of Sir Thomas Holland, K.C.I.E. Of about six people present at a recent meeting to discuss war steel questions, three—the president, the representative of Tatas, B. J. Padshah, and the metallurgical inspector—had all been students of the Royal School of Mines, London, at the same time, the two last having joined on the same day.

The Future

The manufacture of rails, fish-plates, and structural steels has now been successfully and firmly established in Sakchi, and the making of steels for dog spikes, fish-bolts, gun-carriages, and other similar purposes has been a success. In the higher flight of the making of high explosive shell steel the success as to quality may be gaged from the official report that not one shell made from our steel failed under proof, and the verbal statement that no complaints were received from home, and this under conditions when we had to make the maximum possible output in a given share of the full time of the works. The only risk for the future seems to lie in the choosing of the men to control the work.

The author's experiments on the manufacture of basic open-hearth steel have not been merely with reference to rails, but they were made at first on the conveniently high-tempered steel used for these arti-

cles with a view to the higher and higher uses of the steel in the country. The methods tested and advocated are mostly for normal times, as during the stress of war modifications have had to be made for output and economy that may be discarded in normal times, and others postponed till after the war. The methods may be considered too costly for rail steel, but this is not at all admitted for normal conditions. For Tatas the consumption of a little extra manganese is not so vital even now as for many other firms, as Tatas own their own manganese ore mines and for some time have made sufficient ferromanganese for their own use.

For reasons that are fairly obvious now, India must produce as much of her war material within her own borders as possible, hence the experiments on steel. One small advantage of war is that it spurs us on to make the best use of the material we have, and we can turn our experience to good account when peace returns. Damascus and Toledo blades were not developed for table cutlery but for attack and defence, and although much of their fame may be due to the long ago, and one would be unwise to pit them against the best that the skilled Sheffield sword-maker could produce in his day, they must have been splendid achievements. The experience gained in the quest after the best in swords and armor served well for homelier uses.

How Acid Steel May Be Supplied in India

When we have done our level best with basic there may be some of our needs, even in times of stress, that must still be met by acid steel. The ideas the author has at present in those lines, and the nature of the preparatory work already done are as follows:

It has been mentioned that a small output of pig iron of medium hæmatite quality could be produced. It could be made low enough in sulphur with our low sulphur fuel, but might contain 0.06 to 0.07 per cent of phosphorus. Partly for another purpose, but partly to illustrate the methods in mind, samples were taken on Dec. 5, 1917, of three ordinary heats in the works, and complete ordinary analyses of the samples were made by Mrs. A. McWilliam, who was apparently somewhat in front of the times as they are now developing, for during our first few months in India she went through a course of ordinary iron and steel analysis at the laboratory as an added interest to jungle life. She became an accurate analyst of the ordinary elements, and her newly acquired skill was much used, and proved of great value. The analyses may therefore be taken as thoroughly reliable, especially as a few of the less ordinary results have been checked by other workers:

In heat No. 1 the finished steel contained: Carbon, 0.65 per cent; manganese, 0.62 per cent; sulphur, 0.038 per cent; phosphorus, 0.015 per cent. In heat No. 2 the finished steel contained: Carbon, 0.26 per cent; manganese, 0.66 per cent; sulphur, 0.032 per cent; phosphorus, 0.019 per cent. Mean of British standard tests on three bar-mill sections. Maximum stress, 30.4 tons per sq. in.; elongation, 25.4 per cent. In heat No. 3 the finished steel contained: Carbon, 0.22 per cent; manganese, 0.68 per cent; sulphur, 0.028 per cent; phosphorus, 0.030 per cent. Mean of British standard tests on three bar-mill sections: Maximum stress, 29.0 tons per sq. in.; elongation, 28.0 per cent. No. 1 is an ordinary rail heat, but at carbon 0.91 per cent the bath had less than 0.01 per cent of phosphorus in it. In heat No. 2, at 1.13 per cent carbon, the bath contained 0.026 per cent phosphorus, and in heat No. 3, at 11.25, the bath sample showed: Carbon, 1.77 per cent; manganese, 0.17 per cent; sulphur, 0.028 per cent; and phosphorus, 0.011 per cent.

It is obvious from these analyses that if specially low phosphorus scrap were wanted, heats can easily be made with as low as 0.01 per cent phosphorus, and this added to pig of even 0.07 per cent phosphorus content would, with a charge of 50 per cent pig to 50 per cent scrap, produce a steel of 0.04 per cent phosphorus in the acid open-hearth. The method has been tried and proved successful. The other method that the author has in mind, but has only tried to the stage shown here, though to that stage often enough, is best shown in heat No. 3, where the bath at 11.25 had about 1.8 per cent carbon and only 0.01 per cent phosphorus. This material tapped, transferred to an acid open-hearth furnace, and plunged under a slag of suitable composition, could then be worked down into best quality acid open-hearth steel. There has not so far been an opportunity to try this to the end, but the author sees no fundamental difficulty in the way, and the supply of acid steel in India by this method would be just as large a proportion of the present output as it was considered desirable to make.

Good Basic to Replace Acid Steel

The methods, then, on which the author has worked or has in view are first reducing the necessity for acid steel more and more by modifying and improving the process of manufacture of basic steel and studying the effects on the behavior of the steel in use. He has had experiments going on during the last five years on these lines at such times as opportunities arose, and has had the great benefit of the fact that twice for normal work his methods have been changed for others for a short time and twice put back, too expensive an experiment to try on purpose, but most valuable for retesting one's calculations on a somewhat colossal laboratory scale.

The second method is using scrap made purposely very low in phosphorus to water down the rather high phosphorus hæmatite type of pig, which is the only one we could make so far entirely of Indian materials. The third method designed is making in the basic open-hearth a bath of high carbon and low phosphorus, transferring this to an acid hearth and finishing as acid steel in the usual way. A fourth method will be available soon of making the higher class steels in the electric furnace. Those who doubt whether the best higher temper steels can be made on a basic hearth but yet believe strongly in electric steels might be reminded that practically all electric steels are basic.

Interactions Between Basic Slag and Metal

There is a great similarity between the inter-reactions of slag and metal in the basic furnace and those in the acid, allowing for the obvious chemical differences. At first one might think that as, by increasing the lime content of the slag, one can get the phosphorus contents to below 0.01 per cent, while the carbon is above 1 per cent. One ought also to get the bath very low in oxygen by decreasing the oxide of iron in the slag. However, just as it was shown by McWilliam and Hatfield in their paper, "Elimination of Silicon in Acid Open-Hearth," that below a certain basicity of slag the carbon of the bath reduces silica and the silicon is transferred to the steel, a process that can be used to the benefit of the steel, so in the slag basic open-hearth there is a balance point of oxide of iron in the slag below which the carbon of the bath reduces the oxide of phosphorus to phosphorus which returns to the steel, a reaction that cannot be tolerated beyond a very limited degree. There is thus a real essential difference, so far as oxygen in the steel is concerned, between the acid and the basic processes that must be recognized and allowed for. Hence the author's protracted experiments on adding manganese to the bath, a practice which, beneficial even in the acid process, seems essential in the basic for the production of the highest qualities of the higher-tempered steels, for the reasons indicated above. The theoretical considerations, it has been shown, were strongly supported by the results obtained in practice.

The effect of the history of a heat that was discussed in the other paper by the same two authors on "Acid Open-Hearth Manipulation" seems also to have a counterpart in basic practice.

Basic Steel and War

The country that can make the best basic steel with regard to price, output and quality for the work it will be called upon to do, and can make the best use of it, has the greatest chance in war. War, so far as the steel industry is concerned, is an intensified phase of the peace struggle, tonic and educative in its effects. The nation that makes economically basic steel of the most suitable quality for the greatest portion of its demands, assures high reputation and the comparatively unlimited output that under present conditions can only be maintained in basic steel conserves its acid material for the special purposes for which it is still found necessary or preferable, and thus has the best chance in peace times as in war.

Reclaiming Oil From Metal Turnings

Scheme Employed by the Cincinnati Milling Machine Co. Makes Use of a Special Collecting Truck and a Separator Set Flush with the Floor

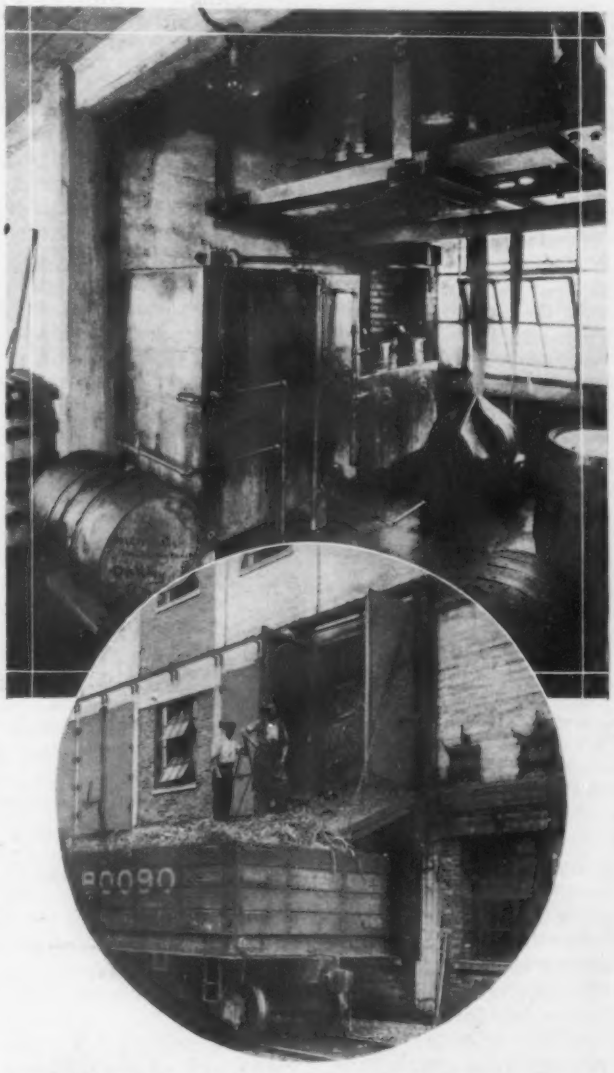
BY C. L. SMITH

A SYSTEM for collecting steel turnings, recovering the cutting oil that usually clings to them and loading them on cars, has been successfully developed in the plant of the Cincinnati Milling Machine Co. In a shop where large amounts of turnings are produced it is difficult to collect them without wasting a considerable quantity of the cutting oil that clings to them with the attendant difficulty of keeping the shop clean. The nature of this class of scrap also makes it extremely hard to handle it economically, and this is practically impossible with the usual methods of making collections from the machines in wheelbarrows, or in cylindrical cans moved on shop trucks.

In developing the system in this plant, one of the first steps taken was to provide receiving trucks for conveying the turnings to the oil and scrap building located about 100 ft. distant from the main plant. These trucks were designed and built in the company's shop and the idea in their design was to eliminate the handling of the turnings as much as possible. Only two of these receiving trucks are needed for the entire plant and they are operated by one man.

The trucks are lined with sheet metal and the sheet covering the sloping bottom is perforated at the lower end to allow the oil drained from the turnings to pass into the tank located below. A 4-in. baffle plate is provided at the front end to divert the oil into the receiving tank underneath and at the top of the perforated section an oil splash guard is placed for the same purpose. The oil tank has a sheet metal sliding top and can be emptied and cleaned with a minimum amount of trouble. A sliding door at the front of the truck is provided for unloading the chips that are raked into the oil separator. The top of the separator is level with the floor, which is more convenient and economical than if the turnings were unloaded into a separator located above the floor level.

In collecting the chips from the different screw machines in the plant a specially shaped galvanized steel pan is used. This pan is placed on a small shop truck directly beneath a sliding door in the oil pan of the screw machines and the chips can be raked into it without spilling oil on the floor. The usual method of removing the turnings from the machine oil pans with a fork and putting them in a wheelbarrow or other receptacle, it is stated, requires considerably more time and a great deal of oil is necessarily dropped on the shop floor. The collecting pans on the shop trucks after being filled are carried to the rear of the shop where the receiving truck is stationed. These pans are provided with a trunnion at each end and the pan is raised and its contents dumped into the receiving truck by one workman using an electric hoist. This method of collecting turnings has enabled one man to take care of the entire plant, working only on the day shift. Formerly it required two men on both the day and night shifts. The amount of labor saved is obvious, and attention need not be called to the cleaner condition of the shop that has been brought about by the present system.



An Oil Filter on the Second Floor Directly under the Oil and Chip Separator Frees the Cutting Oil from Particles of Foreign Matter and Provides Storage Space Pending Redistribution to Different Parts of the Shop, while the Chips Are Discharged into Standard Railroad Cars by a Traveling Platform Operating on a Runway Outside the Building and Serving the Different Loading Ports

The oil reclaiming and scrap storage department is housed in a three-story brick and concrete building, 28 x 90 ft., that is separated from the main shop. All scrap, such as borings and turnings, is conveyed to the third floor on a Warner electric elevator. The turnings are delivered to a Tolhurst oil separator, which has a basket of 14 cu. ft. capacity. This revolving basket is lifted from its seat by a traveling electric hoist through two slings supporting the two trunnions attached to the basket near its center of gravity. The operator of the truck can with ease dump the dry chips in the bin where wanted.

The arrangement of the concrete storage bins for turnings to be loaded on cars is out of the ordinary. The bins have sloping bottoms and sheet-metal doors that are the full height of the bins, which are lo-

cated on the side of the building where the loading track is placed. It will be noted that the bins are about 25 ft. apart, so that a standard 40-ft. car can be loaded from both ends at the same time when desired. A traveling platform, operating on a runway outside the building, serves the different loading ports, or openings.

Cast borings are also loaded in the same way, but the loading ports are not necessary to be as large as for turnings. The same arrangement for loading at both ends of the car is provided for borings, and in this instance it is necessary, as the railroad regulations require such heavy, dense material to be placed over the trucks of the car and not in the center.

Metal Turnings Are Collected from the Different Machines by a Special Truck, Delivered to a Separator Set Flush with the Floor where the Oil Is Removed and Then Placed in Bins Preparatory to Loading on Railroad Cars

On the second floor of the oil house there is a Bowser filter directly beneath the oil separator. This filter has a tank of sufficient capacity to take care of the filtered oil until it is drawn into portable tanks for redistribution to different parts of the shop. On the third floor of the old house a small separator is provided for taking care of brass and aluminum turnings.

Records of the company show that the oil reclaimed from the turnings represents a surprisingly large saving. For instance, in April, 1918, 3092 gal. was recovered, in May 2400 gal. and in June 1402 gal. The general average is about 100 gal. per working day.

NOT ENOUGH ENGINES

That, Says Mr. Ryan, Is Limiting Factor in Air Programs of Friends and Foes

WASHINGTON, Sept. 3.—John D. Ryan, who had taken charge of our air program after the failure of the original Aircraft Board and has been made Acting Second Assistant Secretary of War in place of Edward R. Stettinius, now in France, in discussing the Senate committee report with the correspondents, said: "We are not going to make any promises or predictions"—a keynote quite the reverse of the aircraft policy of 1917. He said the building of the Bristol fighter had been abandoned because it was not a safe machine. Changes have been made in the De Haviland 4's, and "a good many" are being built. Four new types, he said, have been developed.

"The cancellation of the Bristol," he said, "left us for the time being a limited program as far as manufacturing was concerned, because we were developing other types that had not been brought to the point of production.

Four New Machines

"In the last two weeks, as the result of these months of investigation and study and design, we have flown in tests out at Dayton at least four machines that are new as far as our manufacure is concerned in this country. We have flown the SE-5, which is a British machine, a single seated fighter. Samples of it have been brought over from England, copies have been made in this country, and with our engines in them they have been flown and are now being tested. In a few days we will decide whether that machine will go into quantity production or not. The exact copy of the English Bristol with an engine of about the same power that they used in it in England has been brought over here, copies have been made, machines have been built and they are being flown. Another machine now being tested was designed in Detroit by Captain Lepere, a French officer who was brought over here to design machines equipped with Liberty engines. These different machines of that type have been flown and are very promising.

"There are at least two other types of machines that are being flown that we do not think it advisable to give publicity to because they are not so far along that we feel satisfied that they are going through. We do not want to say that we have five types and come out with only three. These are all machines that can be made in quantity, and of course it will take some time to get them into production, but the work of design has been going on. Now we are using, contrary to the general supposition, many American designers of reputation.

Increased Order for Liberty Motors

"We have increased the order for Liberty motors from 22,500, when this bureau was formed, to approximately 50,000—that is the Liberty 12. We have ordered a large number of Liberty 8's, which were developed and set aside temporarily for the 12's, when the larger and more powerful engine was decided upon. We have contracted for some of the best foreign engines, such as the Hispano-Suiza motor. We are going into quite a large production at some of the best engine building shops in America with that engine. Our engine program is a large one. We are giving every inducement to engine builders who are at work on these things and they have to be selected carefully because it is not every engine builder, no matter how successful he has been, who can build a high-powered aeronautical engine.

"We are fully up to the expectations on motor production that we had in May when this bureau was formed. Under present conditions it is impossible to obtain quantity production of a new motor in much less than a year, whereas a new plane can usually be produced in about six months. The Lepere plane has been flying for 30 days, but we are not going to say anything about the performance of a given plane until it has given such performance that we can talk about it. We cannot wait for war conditions to test machines. We have to test them under all conditions that we can supply short of war and depend upon it to pass the final tests."

"What is the Liberty 8 for?" Mr. Ryan was asked.

"That is to be determined," he replied. "It is a 250-hp. engine—the Liberty 12 is a 400—and it is an engine in between the 180-hp. Hispano motor, which we are building in large quantities, and the Liberty 12. There is too much range to be without an engine of that size. We have ordered the Hispano Suiza; we are actually in production on the 180-hp. Hispano, the 300 Hispano has been ordered, and the sample engines have been built, but it is not yet in what we call production. Every one of our Allies is calling for Liberty engines, demanding them, finding it impossible to meet their own production of planes with engines for them. They are all relying on our production of Liberty engines; not for a few engines, but for a large part of their program."

Collective Selling Is Declared Necessary

Important Report on the Reconstruction of France

French Manufacturers Will Place Orders Through a Central Purchasing Agent Assisted by the Credit of the French Government—Tremendous Demand for American Machinery and Materials Expected—Highly Interesting Reports from the Devastated Regions

WASHINGTON, Sept. 4.—Collective selling by American manufacturers will be necessary if they are to participate in the industrial reconstruction of France. Pierce C. Williams, commercial attache of the American Embassy in Paris, has made a most important report on this subject to the Department of Commerce. It goes into details of the situation in the devastated portions of northern France.

Mr. Williams points out that the American manufacturers who are planning to sell articles needed in the reconstruction of the destroyed industries of France must prepare for a revolutionary change in the French methods of purchasing. When the war ends, they need not expect to sell to thousands of individual buyers. Among the industries of the world, the American manufacturer will be the best equipped to sell and to deliver the enormous quantities of machinery and supplies necessary to restore the industries that have been wrecked by the German forces in the occupied portions of France. But instead of selling to thousands of individual buyers, the materials which each will need to rebuild his factory, the American manufacturer will have to deal with a small number of central purchasing agencies representing groups of French manufacturers engaged in the same or related industries, and assisted by the credit of the French Government. To meet these purchasing agencies, says Mr. Williams, it will be necessary for the American manufacturers to group their selling into co-operative agencies. Scattered American efforts, even by large corporations, will not be able to meet the requirements of the huge purchasing power of the state-aided organizations of French consumers.

Extent of War's Damage

"It is difficult to give any adequate idea of the extent of the damage done by war to French industries," says the report of Mr. Williams. "While the area that has been under German occupation for almost four years is small, as compared with corresponding regions in the United States, it should be kept in mind that prior to August, 1914, northern and eastern France, with Belgium, constituted one of the world's busiest workshops. In the invaded Departments of France alone (Meurthe-et-Moselle, Ardennes, Somme, Aisne, Nord, Pas de Calais, etc.) there were nearly 26,000 factories and industrial establishments. These factories represented more than 30 per cent of the industrial output of all of France. Before the war, the departments now occupied by the enemy furnished France with the following proportion of the country's total production of the articles named: Iron ore, 90 per cent; pig iron, 83 per cent; steel, 75 per cent; coal, 70 per cent; combed wool, 94 per cent; linen thread, 90 per cent; sugar, 65 per cent.

Industries Wiped Out

"While the curtain of war shuts off all normal communication between the owners of factories in the invaded district and their property, information is constantly being brought back to them in various ways. Workmen, engineers and superintendents who were caught in the north of France when the German army rolled through have gradually worked their way back to Paris as their repatriation has been accomplished. The information they bring gives an answer to the question as to what remains of French industrial establishments in the invaded districts. In many localities and in numerous industries it may truthfully be said that literally nothing remains. Coal mines have been flooded, and years will elapse before coal will be hoisted out of them again. Electric-power stations and their transmission lines have been in many cases thoroughly dismantled, the machinery carried off by the Germans, and the copper wire sold at auction. Practically all of the equipment in metal-working plants, all the cotton, linen and wool spinning machinery, together with wool-combing plants and textile looms, have been systematically pillaged. Repatriated workmen bring back word that machines have been skillfully taken apart and all the copper and alloys in the bearings sent into Germany for remelting. In many cases, after this was done the iron frame was broken up and turned over to German scrap-iron dealers. Steel structures have been taken down, and the sheet-iron roofs and steel columns and beams have either been sent back into Germany or used elsewhere in the war zone. Sugar refineries and breweries may be considered as completely destroyed. Machine shops finished just before the war broke out have been razed to the ground and, if in the rear of the battle line, the enemy has continued in operation certain plants that are capable of serving his purposes, there is every likelihood that they will later be deliberately destroyed.

Cost of Construction

"Figures give little idea of the material destroyed. But, because there is no other way, the following statistics are given as representing the cost of construction before the war of a few of the industries of northern France that are known to have suffered worst; they are furnished by a trustworthy and semiofficial source:

	Francs
Spinning of combed wool (2,400,000 spindles)	192,000,000
Spinning of cotton (2,800,000 spindles)	184,000,000
Spinning of flax (500,000 spindles)	100,000,000
Wool weaving (56,000 looms)	92,000,000
Weaving of cotton cloth (29,000 looms)	46,000,000
Central electric stations and lines of distribution (300,000 kw.)	250,000,000
Machinery and electrical manufacturing plants	500,000,000
Sugar refineries	135,000,000
Breweries	137,000,000
Small machine shops	350,000,000
Coal mines	900,000,000
Iron mines, blast furnaces, and steel works	2,500,000,000

"These figures do not include the value of the land on which buildings stood; nor (with the exception of the coal mines, the blast furnaces and steel works) do they include the value of the buildings themselves. Neither do they include the value of stocks of raw materials and merchandise in course of manufacture. The loss of these stocks may be considered as complete.

"In addition to the industries mentioned, there are many other flourishing trades represented by up-to-date installations. Ice-making plants, glass works, public works, gas and water works, pottery works, oil works, flour mills, printing plants, establishments for dyeing and bleaching textiles, food-conserving plants, chemicals and fertilizer works, etc., abounded in the invaded regions of France. Their buildings, tools and stocks of merchandise represented an enormous outlay of capital.

"The cost of replacing these industries to-day is conservatively estimated as nearly three times the original cost."

Program of Reconstruction

Since December, 1914, the French Government has been at work on a program for this reconstruction. At that time it enunciated the principle that any damage done by the war should be a charge on the French nation as a whole, but it was also decided that no matter

what indemnity or reparation might be exacted from enemy countries, the French manufacturer should not receive cash for a destroyed or damaged plant. Instead, the State was to assume the obligation of helping to rebuild the industries and to equip them with machinery and raw materials. There was, however, much objection to the State's undertaking the actual purchase and distribution of this machinery and supplies. Minister of Commerce Clementel declared that a Government department could not possibly have the flexibility and rapidity of decision indispensable for success in such an undertaking. He expressed himself as in favor of a private organization representing the manufacturers themselves, conducted without profit and serving as the proxy of the State in the purchase of needed materials. Obviously, the persons best equipped to undertake the actual purchase and distribution of these materials were the owners and managers of the damaged industries. They knew better than any one else what they would require for reconstruction of their own factories.

Groups of Industries

"This idea took concrete form in the latter part of 1915," says the report, "with the organization of the Association Centrale pour la Reprise de l'Activité Industrielle dans les Règions Envahies (Central Association for the Restoration of Industrial Life in the Invaded Regions). The association numbers over 1000 of the manufacturers of the invaded regions of France. For more effective study of the best means of bringing about the speedy reconstitution of industry the membership is grouped as follows: (1) Textile industries; (2) mining, metallurgical, machine, and electrical construction industries; (3) agricultural industries, such as sugar refineries, distilleries, breweries, flour mills, and fruit-conserving plants; (4) miscellaneous industries, including all those not falling within the three preceding categories."

"In the second group were placed the following industries:

Motor vehicles; files and tools; wire-drawing; bolts and and nuts; nails, buckles, screw pins, etc.; chains and cables; electric motors; electric apparatus and fixtures; electric lamps; tubes in iron, steel, copper, and aluminum; builders' hardware, locks, etc.; sheets; boiler work; tinware; agricultural machinery; iron foundries, including malleable iron; foundries of copper, bronze, aluminum, zinc, platinum, nickel, and lead; machine tools; railroad material, including street railroad supplies and equipment; mine and mill supplies; coal mines; iron mines; steel works (soft and special steels; merchant mills; heating and radiating apparatus; balls and ball bearings; heavy machinery; textile machinery; woodworking machinery; public lighting companies; builders of steam engines; electric-power stations; tramway companies; gears and pinions; stampings; manufacturers of springs; auto parts; horseshoes; fabricated steel, girders, trusses, etc.; hardware and kitchen utensils; enameled-iron ware; axes; kneading machines; safes.

Power to Purchase

"This association, however, had no power to make purchases. It could not go beyond the preparation of purchasing programs based on the studies of its expert committees. This defect was corrected in August, 1916, by the organization of the Comptoir Central de'Achats Industriels pour des Règions Envahies (Central Bureau of Industrial Purchase for the Invaded Regions). The capital stock is 1,000,000 francs (roughly $200,000), and the par value of the shares is 100 francs or $20. The stock is held by 226 members of the Association Centrale. The support of the State, without which, obviously, the Comptoir Central d'Achats could not undertake operations, was provided for by a law laid before the French Chambre des Deputes on June 4, 1917, and enacted August 6, 1917. It provided for a preliminary credit of 250,000,000 francs ($50,000,000) to be used as a fund out of which the Comptoir Central could make its purchases. The French Government also committed itself to the principle of collective purchasing of reconstruction materials.

"All decisions of the board of directors of the Comptoir Central are subject to review by the French Government. It will be seen from the foregoing that the Government exercises strict control over the Comptoir Central and its operations. The office charged with this supervision is called the Office de Reconstitution Industrielle des Departments Victimes de l'Invasion, which is a council consisting of eight Government officials and eight members of the Comptoir Central d'Achats.

Not Ready to Buy

"It should be clearly understood by American manufacturers," emphazises the report, "that purchases for industrial reconstruction are not being made by the Comptoir Central at the present moment. The French nation is not allowing its grave concern in the task of the future to distract its attention from the task of the present. Before the work of repairing the war's damage can be undertaken, the war must be won. And to win the war every foot of steamship space must be given over to the transportation of troops and war supplies. For the time being, therefore, no freight space can be spared, not even for the importation of materials that must be on hand before industrial reconstruction in the invaded regions can proceed.

"Since the United States must naturally be counted upon to aid France in the work of industrial reconstruction, the Comptoir Central is interested in getting in touch with American manufacturers. One of the directors of the Comptoir Central informed me that there would be little use in having individual American manufacturers send catalogs to the Comptoir Central, or enter into preliminary correspondence with it with a view to taking orders later on. It has already emphasized in this report that the task of restoring the destroyed industries of France is too huge for individual and competitive buying. The directors of the Comptoir Central are equally certain that it will be out of the question for isolated American firms, no matter how large or well equipped they may be in their own special branch of manufacture, to meet the demand that will be made upon them by France for the restoration of the invaded regions. It is with groups of American manufacturers each group capable of supplying a certain industry in the invaded district with all the materials and special equipment needed for its restoration that the Comptoir Central wishes to establish relations at this time."

Necessity for Group Selling

Mr. Williams uses the restoration of the French steel industry as an illustration of the necessity for group selling on the part of American supplies of iron-mining and steelworks equipment.

"The steel industry," he says, "for obvious reasons must be restored as quickly as possible, so that it may furnish iron and steel products to replace the other industries destroyed by the war. The restoration of the steel industry alone will be an enormous undertaking. Ninety per cent of the 21,000,000 tons of iron ore mined in France came from the mines of the Department of Meurthe-et-Moselle; 85 per cent of the 5,000,000 tons of pig iron produced in France was smelted in blast furnaces in the eastern and northern districts of the country; and 75 per cent of the ingots made in France were cast in the steel works of the regions now occupied by the Germans.

"How can this vital industry be reconstructed except by collective effort? To get some idea of the need for co-operation, let us reverse the picture. Imagine western Pennsylvania ravaged by earthquake and fire. Houses lie in ruins, railway tracks are torn up, bridges are broken down and lie in the bed of the streams, coal mines are flooded with water and their hoisting apparatus is bent into unrecognizable forms of twisted metal, blast furnaces and steel works are piles of crumbling brick. Imagine this blackened and uninhabited country suddenly repeopled and eager to resume its former industrial activity. Unable to find machinery or materials near by, the stricken manufacturers of western Pennsylvania must send 3,000 miles across the Atlantic Ocean to France for help. In such a situation, what would they do? Unquestionably they would first of all band themselves together for co-operative buying, so that there should not be destructive competition and a wasteful scramble for materials. And when this joint effort had secured an approximate of what inventory of what remained and gained a fair working idea of what was needed in the way of tools,

machinery, and raw materials, would not the American victims of such a disaster next look for some collective selling counterpart to their collective purchasing?

Rebuilding Steel Works

"In any case, present indications are that the French steel makers whose plants the war has blotted out of existence will attempt to bring about the restoration of their blast furnaces, converters, and rolling mills by collective buying through the Comptoir Central d' Achats or some other organization affiliated with it. The adoption of this principle for after the war is a natural outcome of the tendency toward concentration, integration, and association that characterized the French steel industry before the war. In place of numerous small steel plants in existence 15 or 20 years ago, the steel production of France to-day is centralized in a comparatively few strong companies, and many of these companies are completely integrated; that is, they operate their own coal mines and their owns by-products coke ovens; they reduce thei ron ore hoisted out of their own mines in their own blast furnaces, and they convert the pig iron into steel in their own Thomas converters and Martin furnaces. Over 90 per cent of the steel output of France is represented in the Comite des Forges, the iron and steel association of that country. And for some years the French steel makers have sold a large part of their product through comptoirs or central selling offices. It is not surprising, therefore, that the French steel makers, when confronted with the task of meeting the overwhelming disaster which the war has brought brought them, should pursue their policy of closer trade association to the point of adopting co-operative buying of reconstruction materials.

"The French steel men believe that one of the best ways for America to help them is by placing at their disposal, as soon as the war ends, some tried form of co-operative selling. The French steel makers do not wish to be obliged to obtain prices from several hundred American firms engaged in the business of supplying the thousands of articles needed in the construction of steel works. They hope to be able through their central buying office to approach strong and responsible American firms, representing groups of manufacturers of steel-works equipment. The representatives of such a group should be in a position to take the blue prints and specifications prepared by the central purchasing office of the French steel industry and name prices and dates of delivery on every piece of machiney and every pound of material needed to enable the French steel makers to resume the manufacture of steel on the sites of their old plants."

W. L. C.

Webb Bill Exemptions

WASHINGTON, Sept. 3.—The Solicitor of the Department of Commerce has issued a ruling defining the application of the exemptions which the Webb law sought to grant to corporations in foreign trade from its anti-trust provisions. The ruling provides that these exemptions cannot be construed in favor of corporations doing business with island possessions of the United States. Neither do they affect corporations engaged in import business. Both of these classes are bound to observe the provisions of the measure, says the decision.

Manganese Ore Imports

Manganese ore imports in June were 38,427 gross tons, comparing with 29,387 tons in May and 58,023 tons in April, this year. For the first six months of this year the imports have been 244,823 tons as compared with 316,790 tons for the same six months in 1917. For the fiscal year ended June 30, 1918, the imports were 558,018 tons as against 656,088 tons for the year ended June 30, 1917.

The By-Products Coke Corporation and the Iroquois Iron Co. issue jointly a monthly periodical, called *Coke and Iron Monthly*, in the interest of employees. It is attractively put together and includes some popularly written technical matter. Some of the contents are in Polish and Croatian.

INDUSTRIAL EXEMPTIONS

New Committee Will Advise District Boards Under the Draft Law

WASHINGTON, Sept. 3.—The passage of the new draft law is the most serious item for consideration in a study of the shortage of skilled and unskilled labor for the industries of the country. The United States Employment Service reports that these shortages are still growing despite all efforts at Government recruiting of labor.

To prevent the draft law, however, from crippling industries, a new organization has been formed by the War Labor Policies Board of the Department of Labor in co-operation with Provost Marshal General Crowder. This is to be known as the Committee on the Relationship of Industrial and Military Manpower. Representatives of this committee will sit as advisors to each of the 168 district boards throughout the United States, to aid in the handling of industrial exemptions. This system is to be included in the new draft regulations. With the aid of the State advisory boards of the United States Employment Service already in existence, the new committee will select in each draft district two members of a committee of three to sit with the draft boards. The third member will be selected by the district board itself. Their authority will be wholly advisory and technical, the War Department insisting upon the right to make the final decision in every case. One of the two committeemen to be selected through the employment service will be a specialist on agricultural labor and will be nominated by the Agricultural Department. The other will be an expert on manufacturing conditions and will be both nominated and selected by the employment service.

In sitting with the district boards, this special committee of three will base its recommendations for exemptions entirely on the list of 64 essential industries now being prepared by the War Industries board. The chairman of the new Committee on the Relationship of Industrial and Military Manpower is Charles Neaves, who has been in charge of the development of the plan.

An attempt was made by the Senate to enforce greater consideration of industrial needs in the new draft law. It added the so-called Penrose amendment directing local draft boards to classify registrants without requiring them specifically to claim exemption. This was stricken out in conference, for Provost Marshal General Crowder had personally told the conferees that the amendment would interfere seriously with the War Department's registration program. He explained that the amendment would compel the redrafting of the questionnaires which had already been mailed to the local boards, in anticipation of the passage of the bill substantially as drafted by the War Department. General Crowder, however, told the conferees that the War Department intended to sanction the creation of these special advisory boards and that it would be the attitude of these boards to determine claims for deferred classification. These boards would also have the power to initiate claims for such exemption.

Brazilian Manganese Shipments in 1917

Exports of manganese ore from Brazil for the last three years are given as follows in a report of the office of Commercial Statistics of the Brazilian Ministry of Finance, reproduced in the *Bulletin* of the Pan American Union: In 1915, 288,671 metric tons, of which 266,801 tons was shipped to the United States; in 1916, 503,130 metric tons; in 1917, 532,855 metric tons. In the last two years all the manganese exported went to the United States. The increase in the movement since the beginning of the war has been great, the total exportation in 1913 having been little over 120,000 tons.

Wetting coke is discussed by H. M. Lane and Dr. Richard Moldenke in the *Foundry World*, a monthly publication of the H. M. Lane Co., Owen Building, Detroit.

SKIP AND BELL HOISTS

Advantageous Use of Alternating Current Drum Type Machines For Bells

Recent developments in the design of alternating-current apparatus, according to a paper presented before the Association of Iron and Steel Electrical Engineers in Pittsburgh, by David L. Lindquist, Otis Elevator Co., have resulted in the successful and advantageous use of alternating current for operating blast-furnace skip hoists. Where the conditions of the furnace hoist are such that they permit starting and stopping at full speed, he stated that the alternating-current motor possesses certain disadvantages which result in greater power consumption at starting, but, on the other hand, he held that where conditions require a definite slow speed for a certain distance after starting the two-speed alternating-current motor possesses distinct advantages in that a definite slow speed irrespective of change in load conditions can be obtained and resistance control is not required. He also held that more accurate stopping is obtained with an alternating-current motor, due, he said, to the fact that the slow speed of this motor is lower and more definite than that of the direct-current motor. It has been found that the two-speed alternating-current motor is as dependable for maintenance of service as the direct-current motor, and, in his opinion, it offers less opportunity for interruption of service through complete failure of the power supply. He also pointed out as a point in favor of alternating-current machines that the tendency in blast-furnace plants is toward more extensive use of alternating current.

The application of alternating current for geared hoist machines is, he emphasized, a comparatively recent development, and the mechanical parts include the latest improvements of direct-current geared machines. The motor used is described as a two-speed slip-ring induction type with two windings on the stator connected in series and two on the rotor, the ratio of the fast to the slow speed being usually 5 to 1 or 6 to 1, although, he pointed out, this may be as high as 10 to 1. The two-speed motor, it appears, may be designed to start from rest on either fast or slow speed, the operation being as follows: Assuming that the conditions permit starting on fast speed, the operator throws the master switch to the extreme position. The potential switch, reversing switch and fast speed switches are energized, admitting current to the fast motor winding and to the brake magnet. The brake then lifts and the motor starts and accelerates to full speed as the rotor resistance is short circuited. The hoist then runs at full speed until the dumping zone is approached, at which point the stop motion switch interrupts the circuit of the fast speed switch coil causing this switch to be de-energized, thereby changing the motor from the fast to the slow speed connection. When the slow speed winding is energized the slow speed rotor resistance is gradually short circuited by the action of the accelerating switches. When the resistance is entirely short circuited, the motor runs at slow speed. As the limit of travel is reached the stop motion switch contacts open the circuits of the reversing and potential switch coils, thereby cutting off all current from the motor and brake magnet, causing the brake to be applied and stopping the hoist.

Diagram 1

Improved Bell Hoist Machines

As an improvement over the crank type of bell-hoist machine, to which he attaches several disadvantages, Mr. Lindquist described an arrangement making use of a standard reversible elevator-drum machine, of which a roping diagram taken from his paper is shown. A pivoted bell lever is used with a counterweight sufficient only to balance about four-fifths of the weight of the empty bell and bell rod. A separate counterweight located on the ground or on a structure near the ground acts as a sealing weight. With the bell closed, the sealing weight is just slightly raised off its support, when it is effective for the purpose of obtaining a definite sealing pressure. Before the bell starts to open, the machine is operated so that the rope unwinds, letting the sealing weight down on its support. As soon as this weight is down, the continued unwinding of the rope causes the bell to open.

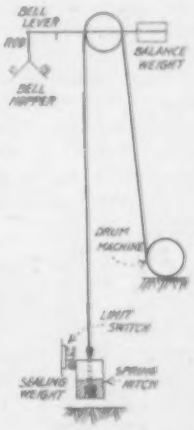


Diagram 3

The bell is closed by operating the machine in the reverse direction, thereby winding up the rope and pulling the counterweighted end of the bell lever down. The weight does not move until the bell seats against the hopper, when the continued winding up of the rope at slow speed lifts the sealing weight off its support. The instant the weight starts to move it strikes a limit switch, and opens the limit switch contact, thereby stopping the machine. This arrangement, he declared, makes certain that the bell will always seat against the hopper with full sealing pressure independent of rope stretch and sag.

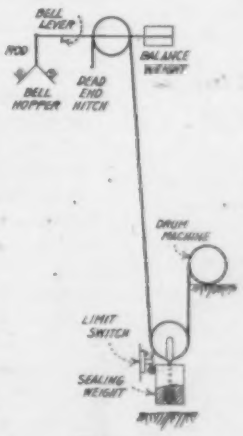


Diagram 2

He attached to the drum type machine the following advantages: It will permit changing the opening distance of the bell by adjustment of the automatic limit stop on the machine. This, he said, is not possible with the crank type machine. Should an obstruction prevent the bell from closing, the sealing weight may be immediately picked up, and as soon as its limit switch opens, the controller is so arranged that the machine will at once automatically reverse, thereby opening the bell. This arrangement provides an automatic clearing of the bell under abnormal conditions with an obstruction between the bell and hopper, and gives an immediate reversal of the bell motion, which does not take place under normal conditions when the bell closes against the hopper. This he considers a decided improvement over what happens under these conditions with a crank type machine, where, he said, any interference with the closing of the bell usually results in an open bell or damage.

New War Service Committee on Hardware

WASHINGTON, Sept. 3.—Plans for the organization of a war service committee of the hardware trade were made at a meeting of representatives of jobbing and other interests with officials of the Chamber of Commerce of the United States held here Aug. 30. Wallace Simmons, St. Louis, who is in Washington on duty in the Treasury Department, was made temporary chairman. Invitations were sent out to important distributers and others and about 30 persons attended, including representatives of several large jobbers and secretaries of various trade associations. The final makeup of the committee, which is to represent all branches of the hardware business, probably will be announced in a week or ten days. It is explained that this committee will not interfere in any way with the war service committee of the hardware manufacturers, which is engaged mainly in solving conservation questions on heavy hardware. The new committee will work with the War Industries Board on all questions of saving steel, fuel and labor in hardware manufacture and distribution.

FERROALLOYS IN COLORADO

Four Plants Smelting Ores of Manganese, Tungsten, Molybdenum and Chromium

The manufacture of important ferroalloys in the electric furnace in the Western part of the United States, particularly in Colorado, has assumed expansive proportions in recent years. A voluminous paper to be presented by Robert M. Keeney, manager of the Ferro Alloy Co., and the Iron Mountain Alloy Co., both of Utah Junction, Col., at the Colorado meeting of the American Institute of Mining Engineers, in September, 1918, gives the following interesting details concerning such operations in Colorado, where four plants are electrically smelting ores and producing ferromanganese, ferrotungsten, ferromolybdenum and ferrochromium.

Before the outbreak of the war, in 1914, the only electric furnace smelting plant operating on a commercial basis west of the Mississippi River was an electric pig-iron plant in California; rare metal ores were not smelted, concentrates of molybdenum, tungsten, uranium and vanadium ores being shipped East for reduction. Practically no chrome ore was being mined, and only comparatively small amounts of manganese ore. To-day there are two electric smelting plants in California, one in Washington, one in Iowa, and four in Colorado; two plants are under construction in California and one in Montana. Ores of manganese, chromium molybdenum and tungsten are now smelted in the West, and although uranium and vanadium concentrates are still shipped to the East they will probably be treated in Western plants in a short time. The four electric furnace plants in Colorado are listed as follows:

Electric Smelting Plants in Colorado

Company	Location	Capacity kw.	Products
Tungsten Products Co.	Boulder	800	Ferrotungsten, ferromolybdenum.
Boulder Tungsten Production Co...	Boulder	400	Ferrotungsten.
Ferro Alloy Co....	Utah Junction	1200	Ferrochrome, ferrotungsten.
Iron Mountain Alloy Co.	Utah Junction	3000	Ferromanganese.

Power for all of these plants is supplied by the Colorado Power Co.

Ferro Alloy Co.'s Plant

The plant of the Ferro Alloy Co. at Utah Junction contains one 750-kw., three-phase furnace, to which power is supplied by three 250-kw. transformers, connected delta-Y to give 129 volts on the furnace cables, the transformer ratio being 13,200 to 75 volts. The furnace operates with an actual voltage of 120 volts, and produces about 3 tons of ferrochrome per 24 hr. from 40 per cent Cr_2O_3 ore. The furnace consists of a steel shell of circular cross-section, 8 ft. (2.43 m.) in diameter by 7 ft. (2.13 m.) deep, lined with magnesite, and having three vertical carbon electrodes 12 in. (30.48 cm.) in diameter.

A 450-kw. furnace, of the same size as the 750-kw. furnace, is also operated on chrome ore. This furnace is three-phase in appearance, but operates electrically as a single-phase furnace. There are three vertical carbon electrodes 8 in. (20.32 cm.) in diameter with a conducting carbon bottom. Power is supplied by three 150-kw., single-phase transformers, two of which have a ratio of 13,200 to 95 volts, and one a ratio of 13,200 to 100 volts. From each transformer, one lead goes to one vertical electrode, and one lead to the carbon bottom, so that the transformers are electrically independent. The furnace voltage varies from 90 to 95 volts.

At intervals, 150-kw., single-phase furnaces are operated on ferro-tungsten. These furnaces have one vertical graphite electrode 4 in. (10.16 cm.) in diameter, with a water-cooled steel bottom contact. The furnace shells are 4 ft. (1.22 m.) in diameter, and are mounted on trunnions, the slag being poured by tilting the furnace. All of the electrodes are regulated by hand. The chrome furnaces are operated without roofs and the tungsten furnaces with roofs. The whole plant has a power factor of 90 per cent.

Iron Mountain Alloy Co.'s Ferromanganese Plant

The plant of the Iron Mountain Alloy Co., also at Utah Junction, contains one 1200-kw., three-phase furnace, and one 1800-kw., three-phase furnace, giving a total capacity of 12 long tons of ferromanganese per 24 hr.

The 1200-kw. furnace is supplied with power by three 400-kw., single-phase transformers, having a ratio of 13,200 to 75 volts, and connected delta-delta. The voltage on the furnace is 72 volts. The 1800-kw. furnace is connected to three 600-kw., single-phase transformers having a ratio of 13,200 to 75 volts, and connected delta-delta. The power factor of the plant is 85 per cent.

The furnace shells in both cases are 18 ft. (5.48 m.) long, 8 ft. (2.43 m.) wide, 7 ft. (2.13 m.) deep, and are lined with magnesite. The electrodes on the smaller furnace are of carbon, 17 in. (43.18 cm.) in diameter, and on the large furnace 24 in. (60.96 cm.) in diameter; in both furnaces they are threaded for continuous feeding. No roofs are used, and regulation of electrodes is by hand.

The Fuller System of Heat Treatment

What is known in England as the Fuller system of heat treatment is offered in the London *Iron and Coal Trades Review* as coming from H. Fuller & Co., hardening experts of Sheffield. The details follow: The system consists in immersing all machine parts requiring heat treatment, whether high-speed steel, alloyed steel, carbon steel, or a non-ferrous metal, in a bath of transparent molten metallic salt of a new and special composition. The following four standard grades of salts are at present manufactured by the company:

A high-speed salt used for hardening all classes of high-speed tools; melting point, from 950 to 1300 deg. C.

Brytesteel salt used for heating all classes of cast-steel tools, carburized steel, and various parts of motor and aeroplane engines; melting point, from 700 to 950 deg. C.

Special salt for low-temperature treatment. The Taylor-White process for high-speed steel, or normalizing; melting point, from 450 to 750 deg. C.

Tempering salts suitable for tempering springs and similar parts, also for quenching high-speed steel; melting point, from 200 to 450 deg. C.

Salts of lower melting temperature than the tempering salt are not made, as oil is more convenient to use for low temperatures. The following advantages are claimed for the Fuller system:

It avoids entirely oxidation, decarbonizing, scaling or blistering of surfaces, and produces a uniform surface hardness. It reduces distortion to an absolute minimum. On account of the metal being efficiently protected from any deleterious gases, the system obviates the possibility of damaging the quality of steel or metal through too long immersion or over-heating. It makes possible the use of unskilled labor in the hardening or heat-treatment shop. It reduces the number of furnaces required, owing to the greater speed with which work can be turned out. Faulty hardening is reduced to a minimum. It is practically fool-proof. The salts being transparent, the work under treatment is visible throughout the process of heating until such time as it acquires the correct temperature, when it disappears from view and is then ready for quenching. With using it, it is possible to register the degree of heat far more accurately than in any gas muffle furnace, an advantage when dealing with alloy steels. The salts are non-poisonous and harmless, both to the metal immersed and to the hardener himself. This means that the furnaces require neither hood nor suction plant to carry off noxious fumes.

The Toronto office of the Metal & Thermit Corporation, New York, is now located at 15 Emily Street, Toronto.

Automatic Shell Heat Treating Furnaces

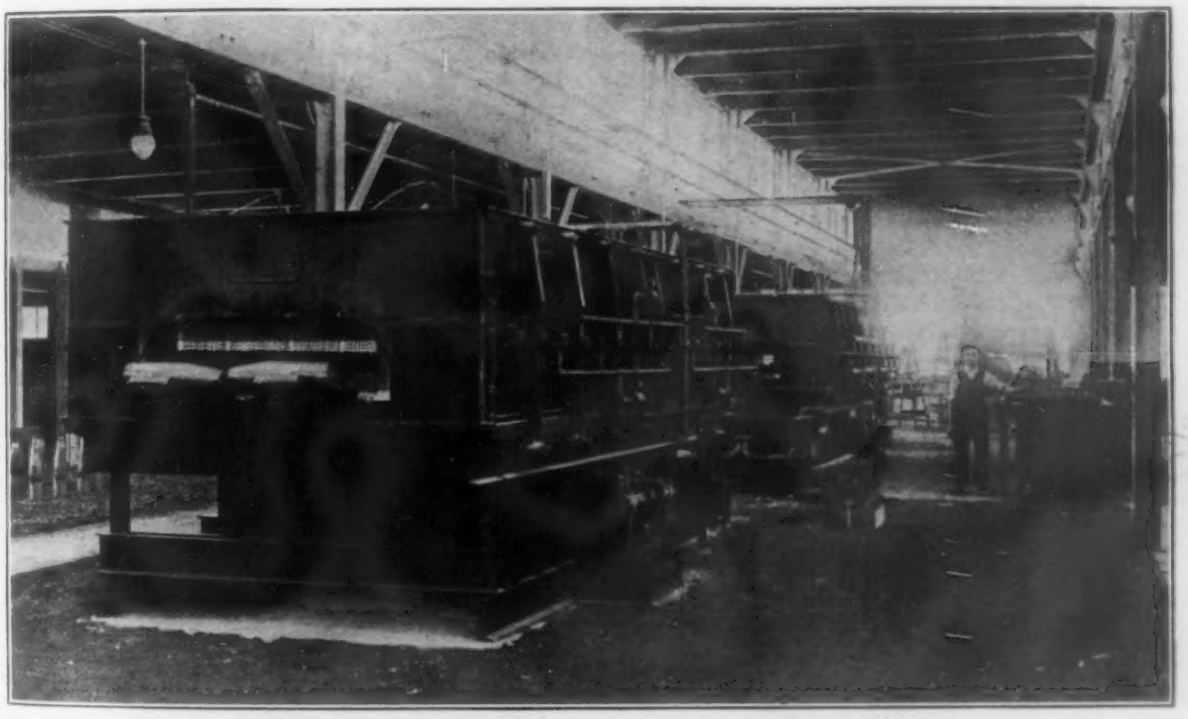
The Human Element Superseded by Mechanical Devices in a New Gas-Fired Installation at Pawtucket

BY W. J. HARRIS, JR.*

THE heat treatment of steel articles having forms where the sections of metal are uneven is justly regarded as a difficult operation. In the case of artillery shell one has to contend with very irregular thicknesses, and, inasmuch as it must be admitted that an improper heat treatment is always injurious, it is absolutely essential that suitable treatment be given to these shells to avoid harming them and thereby reduce to a minimum the possibility of a dangerous accident in their use.

Prior to our entry into the present war, such shell as were made in this country that required heat treatment were fired in an ordinary muffle furnace, relying entirely upon the skill of the operator to obtain the desired result, and in no case of which the writer has knowledge was it necessary or advisable to equip for a large daily production. It is more or less generally thought that by the use of a pyrometer in the furnace accurate results can be secured. This is a mistaken belief, because of the differences in the sections of metal and of the possible inequalities in the temperatures of various parts of the furnace. To rely entirely upon the human element has often been the subject of discussion, and, while condemned, until a furnace was built and put on the market that would eliminate the human factor, it was the only known method of heat treating that could be used.

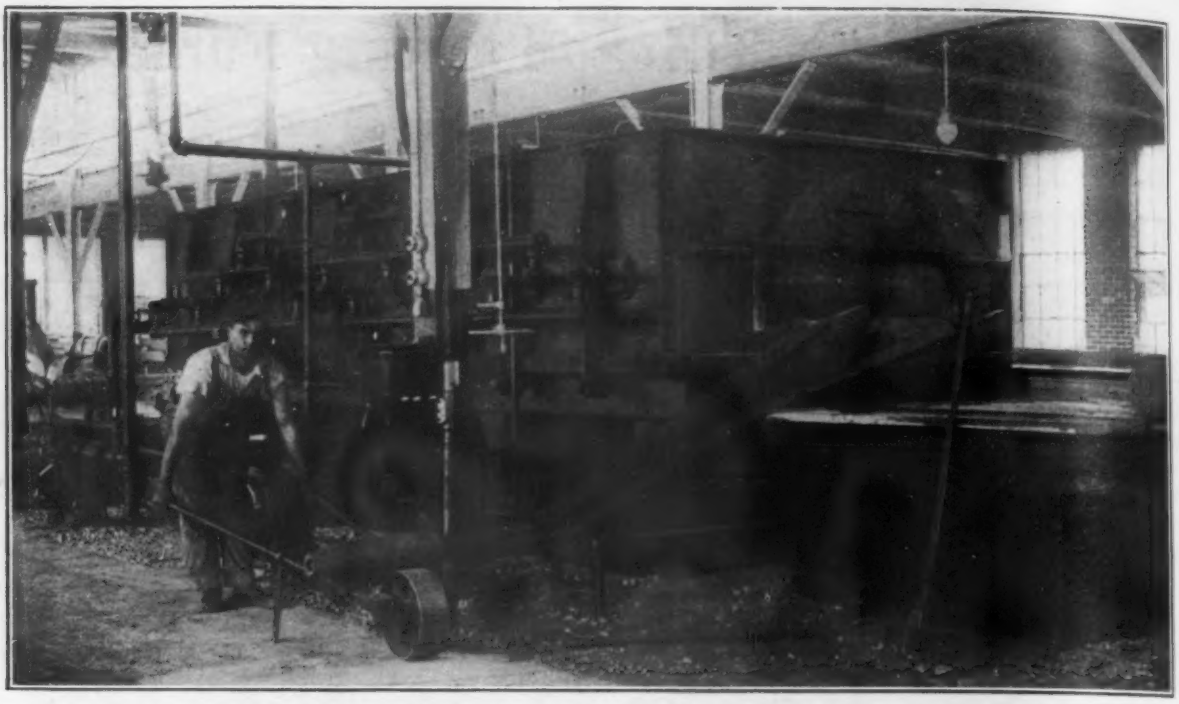
At the beginning of this war a certain number of furnace builders realizing the development the heat treatment of shell was about to undergo and being aware of the inadequate number of skilled furnace operators in this country and the absolute necessity for an accurate and large production, conducted experiments, independently of each other, involving the expenditure of large sums of money in endeavors to produce automatic heat treating machines. Nearly all of the manufacturers of furnaces have been able to produce semi-automatic appliances for shell of the 3-in. calibre which have been more or less successful, but when it came to equipment to handle shell from 4.7 in. up to the largest, the results they have obtained have been far from entirely satisfactory. One can readily see that there is a big difference in handling a shell weighing 20 lb. or less and a shell weighing from 50 to 1500 lb. The sections of metal have a greater variance and the accuracy of the treatment becomes more necessary as the shell increases in size, depending, to a great extent, upon the relations between the thickness of the wall, the length of the shell and its weight.



Furnaces Have Been Developed for the Heat Treatment of Artillery Shell in Which the Movement through the Furnace Is Controlled Automatically

In view of these facts we have conducted our experiments in conjunction with an engineering organization having had wide experience in the actual handling of these large shell so as to combine our experience in furnace construction with their experience regarding the results to be accomplished. This combination led to the development of the automatic heat treating furnace which has been investigated and approved by the production section of the artillery ammunition department in Washington. An installation at the new shell plant of the Potter & Johnston Machine Co., Pawtucket, R. I., has been in operation for more than four months and has proved a complete success in every way.

*Engineering department, Surface Combustion Co., New York.

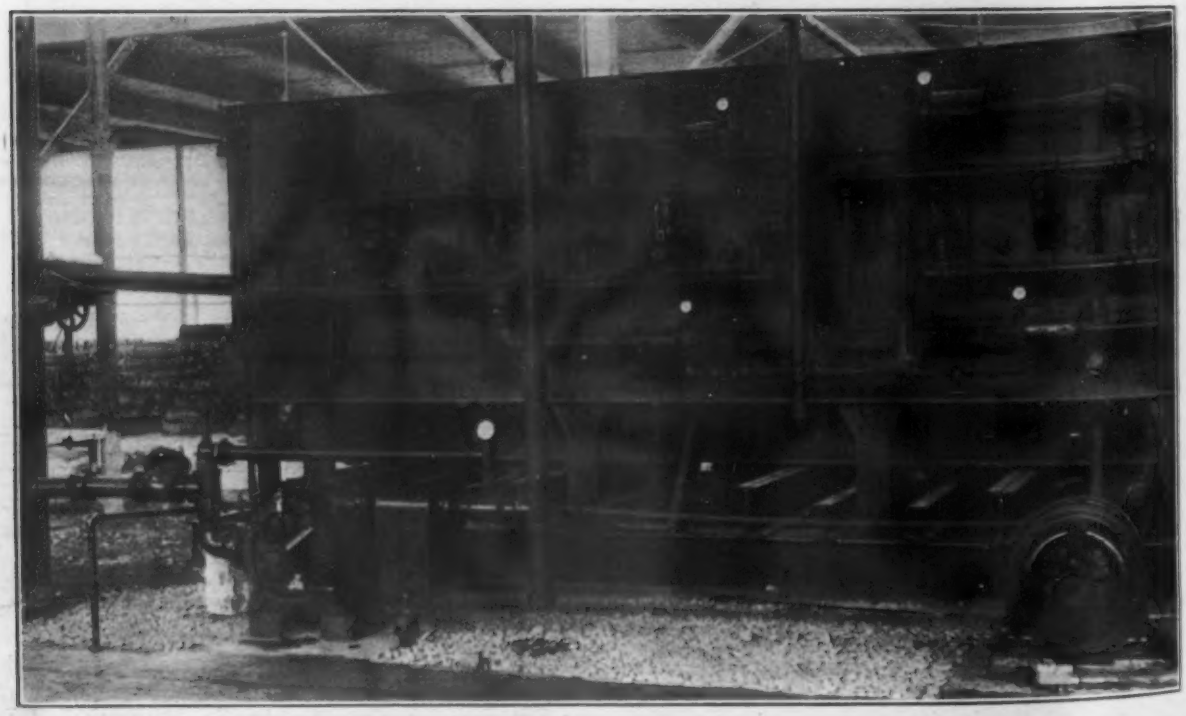


From the Hardening Furnace the Hot Shells Pass Down Inclined Chutes to the Special Truck Which Takes Them to the Cooling Floor, While Those Having a Low Carbon Content Are Quenched in the Oil Tank at the Right

The high-pressure gas burning system, with a rotary compressor, one pipe distributer and proportioning inspirators delivering correct mixture to burners of the impact refractory bed type, is used, although oil may be substituted as a fuel.

A general view of the complete installation at the Potter & Johnston plant showing hardening and drawing furnaces and the oil quenching bath located between them is presented as well as closer, views of the inlet and outlet ends of the hardening furnace. The second shows the feeding rack filled with shells and the last the inclined discharge chutes and method of handling hot shells from the furnace to the cooling floor. The oil quenching tank which is at the right of this illustration will no doubt be needed for some of the shells, which are too low in carbon content to pass the physical tests with the air cooling. A near view of the gas compressor and the side of the furnace showing the piping layout and burner control is also reproduced. This compressor also supplies gas to four small furnaces for the nosing operation. They were originally built for the low-pressure, two-pipe system with air blowers, but have had high-pressure inspirators and suitable burners applied to them. The spacing of the shells for air cooling is shown ir another illustration.

The shells roll through the furnace on cast-iron forms, which are made in short sections, so as to be easily renewable and to avoid distortion. The forward motion of the shell is accomplished by a row of cast-iron plungers operated by mechanism located beneath the furnace and driven by a 1½-hp. adjustable-speed electric motor through a double



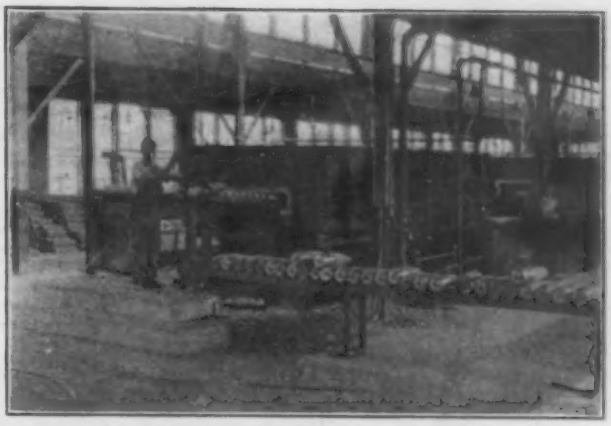
A Motor-Driven Rotary Compressor Is Employed to Raise the Pressure of the Gas Used as Fuel and Delivers It Through Proportioning Inspirators to the Burners

worm reduction, having a ratio of about 4000 to 1. Adjustment of speed is ordinarily required only when starting the furnace. Then a reduced rate is advisable to give a better opportunity for temperature adjustment. The burner control is so simple, however, that an experienced operator can easily hold the temperature with a limit of 5 deg. Fahr. from the desired point for practically any length of time. The shell being supported above the hearth on cast-iron forms and resting on two small points enables the heat to reach all parts of the shell, which eliminates the necessity for keeping the hearth of the furnace above the desired temperature. The movement of the cam is so combined that the shells are rotating almost continuously, which, with the fact that the shells are kept about 2 in. apart, insures the utmost uniformity of heating. Each shell revolving over the entire length of the furnace at the same rate of speed is thus subjected to the same heat conditions.

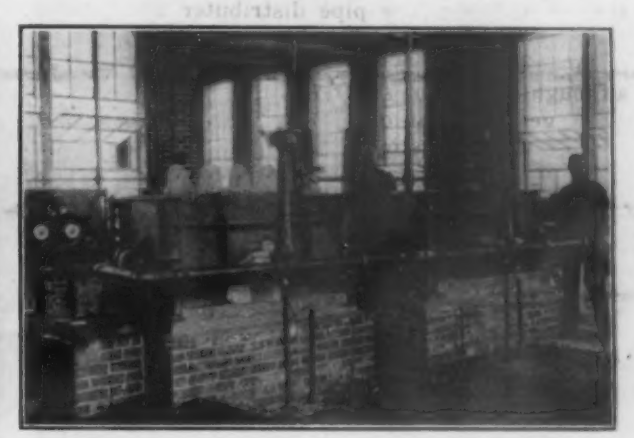
All of the cast-iron parts inside the furnace are rough from the mold and require no machining. The life of the parts exposed to the heat has not yet been finally determined, but already exceeds the life of the hearth in the ordinary design of heat treating furnace, as, after four months of operation, during which time the furnace has been lighted up and shut down every day, none of these parts have shown any necessity for renewal. Should any of these parts fail, they can easily be removed in 5 min. and replaced, without interfering with the operation of the furnace, except for a stoppage for the length of time required to make the replacement. The inside dimensions of the heating chamber are 20 ft. long, 80 in. wide and 27 in. high at the center of the arch.

The features of this furnace and the results obtained can be summarized as follows: The operation of the hardening and the drawing furnace is absolutely automatic, and by the installation of a conveying system from one furnace to the other through the quenching tank, the entire heat treatment becomes automatic, thus insuring a maximum production with a minimum labor cost, two men being able to care for a group of furnaces. It is impossible for the operator to change, by carelessness or lack of knowledge, the amount of time the shell shall remain in the furnace, since this time, which is first determined by the management, is fixed by the speed of the motor. If the loading platform is not kept supplied with shells it will show on the production sheet, it being impossible to forget to load and then make up for it by piling a number of shells in the furnace at one time.

The shells rolling continuously, and never coming in contact with one another, insures a positively uniform distribution of heat and removes the possibility of producing internal strains and cracking of the shell in the quenching, which is primarily due to the shells being in contact with one another. Due to the continuous revolving motion of the shell and the fact that the shell rests above the hearth, the rapidity of the heat absorption by the shell is greater, thus increasing the efficiency of the furnace and reducing the length of time required to heat the shell thoroughly and uniformly. It necessarily follows that the faster the shell absorbs the heat the less the amount of fuel required for the operation. In the case of the installation described the fuel used is gas. The shells were treated at the rate of 50 per hr. at a temperature of 1500 deg. Fahr. and required only 5000 cu. ft. per hr. of 530 B.t.u. city gas. The weight of



The Shells Are Transferred from the Conveyor to the Feeding Rack at the Inlet End of the Hardening Furnace by a Hoist

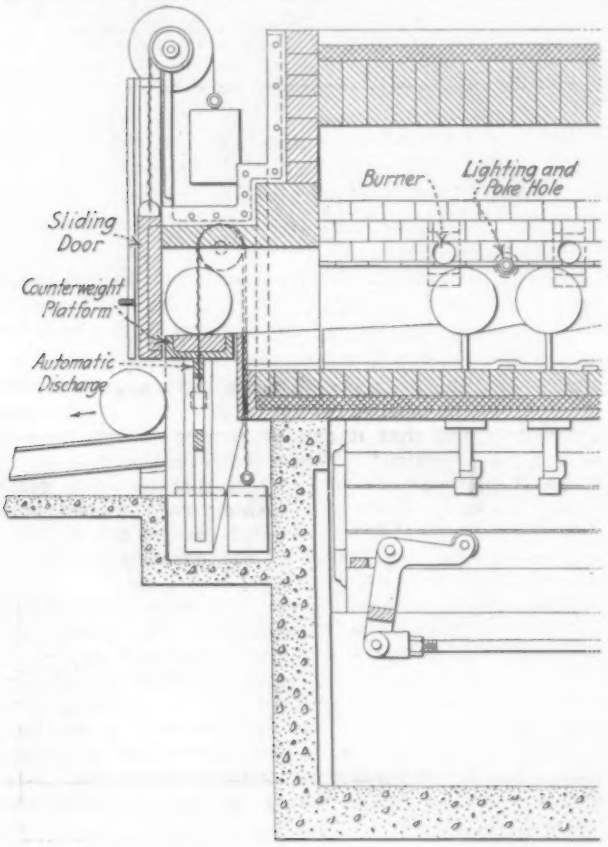


Four Small Furnaces Originally Built for a Low-Pressure Two-Pipe System and afterward Equipped with High-Pressure Inspirators Are Employed for the Nosing Operation

The Cooling Floor with the Shell Spaced for Air Cooling

a shell being 95 lb., this corresponds to a thermal efficiency of over 45 per cent, which seems unusually high, but it has been checked by repeated observations and is undoubtedly accurate. The automatic proportioning feature shows its value by the entire absence of scale on the shells as they leave the furnace. The heat treatment given is a regular air quench, that is, the shells are taken from the hardening furnace and quenched in the air. This treatment is sufficient to meet the requirements of the present specifications.

Furnaces of the same type, giving a production of from 50 to 120 shells per hr., are available for all sizes of shell from 4.7 up to 20 in. in diameter. A



Where Shell Larger than 10 In. in Diameter are Handled a Special Counterweighted Discharge Platform Delivers the Shell to the Cooling Space or Quenching Tank, Provision Being Made to Guard against a Direct Draft of Air on the Shell

special feature is added to the furnace when shells of 10 in. and above are handled. Contrary to the standard type, the door at the discharge end is not of the chain screen type, which is only suitable for small shell, but a regular door is provided that is used only in case of repair work. As the shell rolls from the last pusher it stops on a counterweighted platform which lowers down and releases the shell toward the quenching tank or cooling space. With this arrangement it is impossible to have a direct draft of air on the shell or in the furnace, which would produce scale and create unevenness of temperature on the shell.

These furnaces are built by the Surface Combustion Co., New York, under license from the inventors, Alcorn, Blockhouse & Co., Philadelphia.

Magnesium is made by the Norton Laboratories, Inc., at Lockport, N. Y., the American Magnesium Corporation, Niagara Falls, N. Y., and the Rumford Metal Co., Rumford, Me. Reports made by these three companies to the U. S. Geological Survey show a production of 50,384 lb. of metalic magnesium in the first quarter of 1918, and 66,554 lb. in the second quarter, making a total of 116,938 lb. in the first half of 1918. The total production in 1917 was 115,800 lb.

Locomotive Crane for Heavy Service

The United States Crane Co., 122 South Michigan Avenue, Chicago, has placed on the market a new standard eight-wheel locomotive crane designed by its vice-president and general manager, A. Eilersgaard. The company is affiliated with the Joliet Bridge & Iron Co. and the De Pere Mfg. Co., at whose plants the new cranes are being built. Mr. Eilersgaard, prior to his connection with the United States Crane Co., was in charge of the crane department of the Link-Belt Co., Chicago. He has been associated with crane design.

The locomotive crane now being manufactured by the new company has been designed to meet the exacting and severe service demanded by steel mills and industrial plants, its mechanical parts being made heavier and more accessible than is usual. The rotating base, side housing, bracket boxes for travel gearing and other important parts are made of open-hearth steel castings. All gears are open-hearth steel castings, with cut steel for level and spur gears.

The ten principal bearings are all alike with interchangeable split flanged bronze bushings, and all clutches are alike with interchangeable parts. Turning one nut will adjust each clutch. Special attention has been given to adapt the crane to stand heavy and constant switching with a reasonable upkeep expense, and to this end all gears and clutches have been made especially heavy.

Westinghouse Marine Expansion

So imperative have become the demands for marine propelling equipments for the Emergency Fleet Corporation that recently the new Essington plant, South Philadelphia, of the Westinghouse Electric & Mfg. Co. has been placed in operation for the exclusive production of this equipment.

At present the Essington works occupies a comparatively small part of the 500-acre tract, which provides for ultimate expansion, and contemplates an increase of three to four times its present capacity. Seventeen months ago the Essington plant project was only a carefully conceived plan on paper. To-day it is an entirely completed plant.

At present the particular work at Essington is the production of complete propelling equipment for merchant vessels which are being built for the Emergency Fleet Corporation. This plant, devoted entirely to the production of Westinghouse geared turbine ship propelling machinery, is sufficient for 15 average vessels.

The record for holes punched singly in 10 hours has been broken by the Ferguson Steel & Iron Co. of Buffalo, which is fabricating and assembling 16 steel barges for the United States Railroad Administration. A. Rostowicy, expert puncher for the Ferguson company, punched 18,624 holes in 10 hours, most of the holes being about 4 in. apart. This breaks the record held by Charles Milburn of Chicago, who several years ago punched 18,310 holes in 10 hours. By breaking the record Rostowicy has achieved something many men have tried to accomplish during the past year and a half, since the United States has gone into shipbuilding in earnest. His record means that he punched 31 holes a minute, or at the rate of one hole every two seconds throughout the 10 hours.

"Slag Viscosity Tables for Blast-Furnace Work," is the title of Technical Paper No. 187 of the U. S. Bureau of Mines. It is written by Alexander L. Feild and P. H. Royster. It gives, as a result of investigations relating to efficiency in the smelting of iron ores, the conservation of the raw materials used in blast furnaces and the profitable utilization of lean and complex ores, a table giving the viscosity in absolute units of iron blast-furnace slags over a wide range of composition and temperatures. None of this information has hitherto been available for the use of the blast-furnace operator.

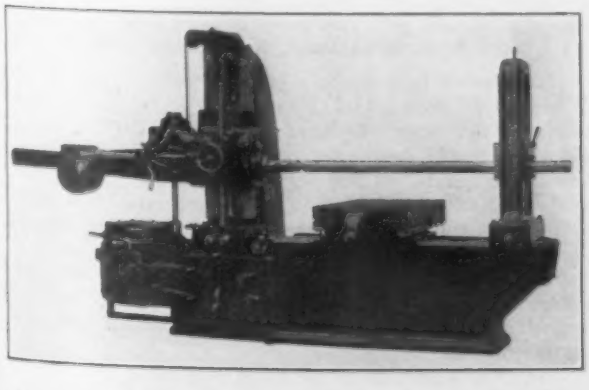
A Horizontal General Utility Machine

For use in operations where intensive production and precision work are of importance, the Defiance Machine Works, Defiance, Ohio, is offering a horizontal boring, milling, drilling and tapping machine. The speed and feed changing mechanisms and the contents of the spindle holding are of unit construction, each readily accessible without disturbing the parts of the other units and a three-point contact with the floor is provided, which allows the machine to be moved to various locations in the shop easily. The column is of similar construction and is fastened to the bed with bolts. Its area at the base is relied upon to give correct alignment and rigidity to the spindle head and all the working parts which it supports. The spindle head has a large bearing on the column and the counterbalance provides for relieving the elevating screw of any undue strain while the head is being adjusted to any point in the 24½ in. of its vertical travel. The actuating screw is located in the center of the column ways between a dovetail guiding edge and a tapered take-up gib, both of which are on the inner edge of the column ways. Clearance is provided for the rear end of the slide while the front one has a binder gib. This arrangement, it is pointed out, tends to bring the guiding edge as well as the clamping surfaces close to the spindle nose and the work and provides a rigid support for the cutting tools.

The platen has a working surface of 24 x 48 in. with deep planed T-slots. The cross-feed of the platen is 40 in. and a stop device is provided which can be set to disengage the feed automatically at any position on the saddle. When the platen reaches either end of its travel the feed is automatically thrown out. A longitudinal adjustment of 36 in. is provided for the saddle and a safety friction is employed to discontinue the feed when the work is fed into contact with an obstruction.

The 12 feed changes for the spindle, spindle head, platen and saddle are obtained by two levers operating two cones of gears, the application of the feed to any particular part of the machine being controlled by a lever and simple index. In addition to these power feeds which range from 0.003 to 0.375 in. per revolution of the spindle, hand feeds with dials graduated in thousandths of an inch are provided for the spindle head, platen and saddle. The feed control lever and the fast travel lever are located close to each other and are interlocked to prevent simultaneous engagement. Clutch levers which are located near the spindle nose provide for hand fast travel of the spindle. Safety frictions are provided for the feed train and the fast travel mechanism to prevent jamming.

Two cones each consisting of five hardened gears which work in conjunction with the back gears are provided to give 10 speed changes ranging from 15 to 336 r.p.m., the changes being obtained by a hardened gear which is rolled into mesh with any set of gears on the cones by a conveniently located lever. The back gears which are located at the source of power and not in the spindle head are driven from the pulley driving shaft through a friction clutch. This arrangement, it is pointed out, reduces the speed and wear on the intermediate mechanism as well as relieving the spindle head of weight and vibration.



Separate and Readily Accessible Units Are Provided for the Feed and Speed Changing Mechanisms and the Contents of the Spindle Housing in a New Horizontal Boring, Milling, Drilling and Tapping Machine for Intensive Production of Precision Work

A New Universal Index Center

The Schipper universal index center is a new machine tool appliance that has been placed on the market by C. F. Kern, Hulbert Block, Cincinnati. It is

Ability to Shift the Head to Any Angle from 10 Deg. Below the Horizontal to 10 Deg. Beyond the Vertical and Rotate It on the Base to Any Desired Angle, as Well as Provision for Dividing All Numbers from 2 to 400 Inclusive, Characterize a New Universal Index Center

stated that the head can be set at any angle from 10 deg. below the horizontal to 10 deg. beyond the perpendicular and that it can be rotated on the base to any degree required. These features are claimed to make it particularly valuable in cutting bevel gears on a plain milling machine, gashing worm-wheels, milling counterbores, etc. The head can be set at right angles for drilling, which is not possible ordinarily, unless the tongues are removed.

The centers swing 10½ in. The index plates divide all numbers from 2 to 400 inclusive. The spindle center has a No. 9 Brown & Sharpe taper and is 1 in. in diameter at the large end, while the other spindle has a No. 11 Brown & Sharpe taper, 1½ in. in diameter at large end and an adjustable taper bearing at rear end. A clamp ring relieves worm and worm-wheel and index pin from all strain during cutting operation. Provision is also made for taking up wear of worm and worm-wheel.

The head and foot stocks are fitted with ⅝-in. tongues to fit standard slots in milling machine tables. Special tongues can be furnished. Four T-bolts and two wrenches are furnished with each pair of centers. The shipping weight is 105 lb. boxed.

Application of Government Prices Is Limited

WASHINGTON, Sept. 3.—The Price Fixing Committee of the War Industries Board has decided that where prices are stated to be fixed for the United States Government, the governments associated with it in this war, and the public (or primary civilian sales), these prices shall extend to the Government and civilians of the United States (including civilians of its territories and insular possessions) and to the governments of Great Britain, France, Italy, Belgium and Japan; but that these maximum prices shall not extend to purchases made by the civilians of the latter mentioned allied nations nor to the governments or civilians of nations other than those enumerated.

The Société des Hauts-Fourneaux du Chile has instructed its technical manager, M. Prudhomme, to proceed to Chile to arrange with the government of the Republic for the starting of the blast furnace at Corral. The company's representative at Santiago reports continued negotiations with the Chilean Government to obtain their official co-operation in completing and extending the plant at Corral, including the establishment of steel works, rolling mills, and other works.

Bridgeport Employers Accept Award

About Four Thousand Employees Refuse to Work—Smith & Wesson Co., Springfield, Mass., Objects to Decision in Its Case—Proposes Government Operation

Following the promulgation of the award in the Bridgeport wage controversy, Aug. 27, as reported in THE IRON AGE of Aug. 29, the manufacturers held a meeting, Aug. 29, and voted to accept the award. On the same night the local machinists' union held an open meeting and by a voice vote called a strike in protest of the award. At another meeting the following day the machinists voted to stay out until all the plants agreed to pay a minimum rate of 80 cents an hour to toolmakers and 70 cents an hour to machinists. About 4000 men were out last Saturday, affecting most of the small and several of the large plants, but it is predicted that the men will return to work by the last of this week, as cooler reflection shows them that the wording of the award does not close the door to further consideration of the vocational classification and minimums which they asked for. The underlying cause of the strike (which is against the orders of the officers of the International Machinists' Union) is that the skilled element gained none, or at most but little, increase in wages.

Men now receiving 40c. an hour are granted 46c. per hr. under the terms of the award, the 41c. rate will be raised to 47c., 42c. to 48c., 43c. to 49c., 44c. to 50c., 45c. to 51c., 46c. to 52c., 47c. to 52½c., 48c. to 53c., 49c. to 54c., 50 to 55c., 51c. to 55½c., 52c. to 56½c., 53c. to 57½c., 54c. to 59c., 55c. to 60c., 56c. to 61c., 57c. to 62c., 58c. to 63c., 59c. to 64c., 60c. to 65c., 61c. to 66c., 62c. to 67c., 63c to 68c., 64c. to 69c., 65c. to 70c., 66c. to 71c., 67c. to 72c., 68c. to 73c., 69c. to 74½c., 70c. to 75¾c., 71c. to 77c. Those men getting 72, 73, 74, 75, 76, 77 and 78c. will all receive 78c. per hr. The workers paid more than 78c. per hour will not be affected.

The interpretation of the various clauses of the award is very obscure and the examiner who is to act as administrator has not yet been appointed. A force of 13 examiners and field men has been in Bridgeport prepared to start the machinery for the selection of the members of the local board of six members which is to be selected according to the terms of the award. They had taken no active steps on account of the strike.

Some Details of the Decision

WASHINGTON, Sept. 3.—The complete text of the decision of the National War Labor Board, in the Bridgeport controversies, based on the award of O. M. Eidlitz as umpire, is now available. Three of its rulings are of particular interest because of their bearing on future cases. They cover the establishment of the 8-hr. day, the refusal to grant new classifications and the right of collective bargaining.

The decision quotes the principle of the War Labor Board on "Hours of Labor" as follows:

> The basic 8-hr. day is recognized as applying in all cases in which existing law requires it. In all other causes, the question of hours of labor shall be settled with due regard to Governmental necessities and the welfare, health and proper comfort of the workers.

"In view of the fact," says the decision, "that the evidence proves that an overwhelming majority of the firms, parties to this controversy, have through the operation of this principle, or voluntarily, conceded an 8-hr. work day to the workers in their shops, it is only reasonable that those firms which hold a different opinion should comply with the will of the majority and hence the 8-hr. work day should be established in all shops and factories subject to this ruling. I am constrained to come to this conclusion, knowing the dissatisfaction and consequent interference with output that accrues in a manufacturing community where a basic work day has come to be generally recognized but is resisted by a minority."

The employees had demanded a comprehensive reclassification scheme. The ruling of the umpire on this point, approved by the board, follows:

> In support of their contention the workers have cited the case of the shipyards, where classification of trades and minimum wages have been granted. This is not a parallel case to the situation in Bridgeport, because most of these shipyards were created within the year, and their workers recruited to a large extent from organized labor in the building and allied trades, in which trades classification and minimum wage had long been recognized. The Wright-Martin Aircraft, the Bethlehem Steel and the Worthington Pump awards were made in plants that were practically under control of the Government. The Government, having recognized classification and minimum wage in its arsenal and navy yards, followed its own precedence in these cases.
>
> In Bridgeport, however, we find these various shops and manufacturers operating on war work direct or secondary, and on many other essential products, but under such varied conditions of operation and contract that under the principles enunciated above, and under the pronouncements made by the various Governmental Departments and the Federation of Labor, I must deny the right to the worker to receive at this time classification of trade and the minimum wage.

Concerning the establishment of "collective bargaining" the decision says:

> The representatives of the War Labor Board have agreed that in accordance with the principle of the National War Labor Board, the right of employees to bargain collectively is recognized and is guaranteed to the workers of Bridgeport. This recognition admits that we have passed from the day of the individual to the day of the group, and that the will of the group should have precedence over the will of the individual.
>
> The members of the National War Labor Board have also agreed that Bridgeport should have a local board of mediation and conciliation of six members, three from each side. They have also agreed that the War Labor Board shall appoint an examiner.
>
> Here, then, we have the beginning of an organization which has been accepted by the representatives of both sides on the War Labor Board, to map out a plan with the aid of the employers and employees of Bridgeport, to introduce the principle of collective bargaining, and to provide ways and means for allaying the labor unrest due largely to the dilution of labor which the war needs have made necessary.
>
> It must be realized that, due to the complexity of conditions existing in the factories and shops of Bridgeport, the element of time and care must enter, so that an equitable proposition as between the parties at issue may result. I would designate a period of six months, the report to be ready March 1, 1919.

Smith & Wesson Co. Rejects Award

In a letter to Secretary of War Baker the Smith & Wesson Co., Springfield, Mass., states that rather than abide by the recent decision of the national War Labor Board it would prefer to have its plant taken over by the Government for the period of the war. The letter asserts that the plant has been singularly free from labor troubles for many years and that it sees no reason "why it should abandon methods of doing business proved to be conducive to industrial peace and high efficiency for the fantastic method outlined by the War Labor Board in its recommendations for dealing with its employees."

Another assertion of peculiar interest is this: "It is generally recognized by employers in this part of the country that since the promulgation of the War Labor Board principles, labor leaders look upon that declaration as a license to agitate and to organize the em-

ployees of every plant engaged in war work irrespective of the known conditions under which any given plant may have been operated and irrespective of the legal rights of employers."

The individual members of the management pledge themselves "to assist any Government officer in charge in every way to conduct the said business as advantageously as is possible with such a system in force."

The letter to the Secretary of War is in part as follows.

Letter to Secretary Baker

"This company has been singularly free from strikes or labor troubles of any kind for upward of 14 years and indeed until the recent activity of labor union leaders outside the plant to unionize it. It is generally recognized by employers in this part of the country that since the promulgation of the War Labor Board principles, labor union leaders look upon that declaration as a license to agitate and to organize the employees of any or every plant engaged in war work irrespective of the known conditions under which any given plant may have been operated, and irrespective of the legal rights of the employers. To each activity the words of our Federal Supreme Court are especially applicable.

"The cardinal error of such a position lies in the assumption that the right is so absolute that it may be exercised under any circumstances and without any qualification; whereas, in truth, it must always be exercised with reasonable regard for the conflicting rights of others.

Individual Control

"For 14 years the company has been conducting its business openly and above board upon a non-union basis, making a written contract with each individual who enters its employment, in which he agrees that during employment he will not become a member of any union without giving the company a week's notice in writing of his intention to do so. It was admitted by labor union officials at a hearing by commissioners appointed by the War Labor Board that the system adopted by the company was known to them at the time they were making speeches in front of the company's premises and inducing employees to join the union. Such organizing activities as those admitted have already received the condemnation of the United States Supreme Court in the Hitchman Coal & Coke Co. case in the following language:

"'The inducing of employees to unite with the union in an effort to subvert the system of employment . . . by concerted breaches of the contracts of employment known to be in force there . . . were unlawful and malicious methods and not to be justified as a fair exercise of the right to increase the membership of the union.'

"Rather than voluntarily to continue to conduct, under the conditions laid down by the War Labor Board, a business which it has built up to a point of highest efficiency, it prefers to see such business lawfully taken over and conducted by the Government for the rest of the war. If such a course is adopted by the War Department the individual members now comprising the management will be pleased to assist any Government officer in charge, in every way to conduct the said business as advantageously for the Government as is possible with such a system in force.

"We take this position because the company is convinced that the adoption of any such scheme as that outlined by the War Labor Board would result in such demoralization of business morale, such dissatisfaction of a large number of loyal employees who have been in the service of the company for many years, such lack of respect for the rightful authority of the present managers upon the part of an aggressive minority which has in a comparatively recent period found employment with the company—in some instances, as the company is informed, for the express purpose of unionizing the plant—as to render the position of such managers in the company intolerable; and that it would further result in such loss of efficiency in the production of war material that the management cannot and will not assume responsibility therefor."

In its letter to the National War Labor Board, in which it refuses to adopt the recommendations of the board, the company asserts that the board is not following its own principles when its extends its unionizing activities to establishments which have previously barred from employment union members; that the present is not a time, under the guise of settling labor disputes, to substitute a social and economic theory, at best of doubtful value, which could by no possibility be imposed upon the business world in normal times, for established lawful methods of known practicability and proved efficiency; that the principle laid down by the board that an employer should not under any circumstances discharge an employee for membership in a trade union is logically sound, economically necessary or legally tenable; and that to adopt the recommendations of the board would tend to lessen or destroy the morale of the workers, would promote arguments and dissensions, would impair the efficiency of the workers, and would reduce the production so badly needed.

Will Appoint Industrial Advisers

WASHINGTON, Sept. 3.—As soon as President Wilson had signed the new draft law, the Federal directors of the United States Employment Service for the various States were instructed from Washington to call a meeting of the State advisory boards at once to recommend the names for the Department of Labor's selections as industrial advisers for each of the district draft boards in their States. The nominations will be made by the Director General of the United States Employment Service and the Secretary of Labor, after consideration of the names sent by the State directors. The nominees may be members of Community Labor Boards or may hitherto have had no connection with the Federal Employment Service.

Only Real Workers Exempted

Uniontown, Pa., Sept. 2.—Industrial exemption in the army draft now embracing virtually every coal and coke employee by its extended ages will be granted only to men with full-time records. Coal or coke workers whose labor record in the mines show lapses for which no reasonable excuse can be advanced will receive no consideration either from the draft board or from the operators who must make the supporting affidavits.

George E. Gay of Uniontown, member of the district draft board with jurisdiction over the coke region, and W. L. Byers, upon whose shoulders rests the responsibility of maintaining production at its peak, are agreed upon those points in the application of the draft law. A coal and coke worker will be classed as essential only when his labor record shows him a full-time man. That record is being kept by the Fuel Administration and will be brought into use when consideration of exemption claims is commenced.

Electric Pig Iron in Italy

Electro-Metals, Ltd., London, is putting up an extensive installation for the electric smelting of iron ore for Messrs. Ansaldo in Italy. At first there will be two plants of 4000 hp. each, to be followed by four of the same size, bringing the total up to 24,000 hp. The six plants together will be able to reduce 150,000 tons of ore annually. The current will be obtained from a three-phase, high-tension supply through static transformers, three of which for each furnace will have a capacity of 1200 kva. each, and will be so arranged that the voltages on the secondaries can be varied between 35 and 70 volts in eight successive stages. The gas produced will escape through openings near the top of the shaft, and after being cleaned can be used for heating in the steel works. A portion of it, however, after being passed through a dust extractor and centrifugal washer, will be forced by a fan through tuyeres into the upper part of the furnace chamber.

The E. M. Dart Mfg. Co., maker of pipe unions, is now located in its new building at Thurbers Avenue, Eddy and Blundell streets, Providence, R. I. The office is located at 134 Thurbers Avenue.

ELECTRIC HEATING FURNACE*

The Conditions Surrounding Its Substitution for Natural Gas Heating

The substitution of electricity as a heating agent instead of natural gas—or of any form of fuel, for that matter—is a much more complicated problem than the substitution of one fuel for another. Electricity costs a certain amount per kilowatt-hour at 3412 B.t.u. each. It is easy to figure out what a B.t.u. of heat energy costs in each case. Natural gas of 1000 B.t.u. per cubic foot at 27c. per 1000 ft. means 27c. per million B.t.u. Electricity at 1c. per kilowatt-hour means $2.94 per million B.t.u. Thus, electrically generated heat units are nearly eleven times as expensive as those produced by the combustion of gas.

Let us take the case of a coal-fired steam-engine-driven electric generating plant. The boiler efficiency will be in the neighborhood of 65 per cent and the engine efficiency 15 per cent; generation and transmission efficiency 85 per cent; total over all efficiency $0.65 \times 0.15 \times 0.85 = 0.083$ (approximate average value). If the coal has a thermal value of 14,000 B.t.u. per pound, this means that $14,000 \times 0.083$, or 1162 B.t.u., are obtained for each pound of coal burned. Similar reasoning can be applied to any kind of fuel-fired, electricity-generating plant, with similar results. By such calculations it appears to be entirely beyond question that the utilization of the heat of combustion, directly as the heating agent, is more economical than to use electricity generated by this method.

Efficiency of Application of Heat

In the preceding statements no mention has been made of the efficiency of the application of heat. Here, however, we are not always on known ground. The maximum temperature to which that body can be heated is limited by the temperature of the flue-gases passing out of the chamber. If only a low temperature is desired in the body, a large proportion of the heat may be removed from the flue-gases and they may be allowed to pass out fairly cool. If a high temperature is desired in the body, then the flue-gases must go out at a high temperature, and therefore carry away most of the heat of combustion with them. Thus, in the case of a steam-boiler—a low-temperature application—it may be possible to obtain in the steam as much as 80 per cent of the heat of combustion from the fuel; but in a high-temperature forge furnace only 2 or 3 per cent of the heat of combustion may be obtained in the heated steel as taken from the furnace.

An electric heating equipment is not subject to this flue-gas loss, and may therefore be operated at a higher thermal efficiency. An electrically heated steam generator can be made to give efficiencies as high as 95 per cent, while a high-temperature forge furnace may operate at 50 to 60 per cent. Even though the efficiency of application was high in the case of electricity, the cost of a heat unit has been so much higher than that obtained from gas that it has long been considered uneconomical from a cost standpoint except in very special cases. It has not been many years since costs of natural gas in the neighborhood of 5c. per 1000 cu. ft., and of electricity in the neighborhood of 5c. per kilowatt-hour were common. Under these conditions it is obvious that on a strictly thermal consideration electricity could scarcely be used except when there was some very unusual condition.

Cases of Electric Heating

An application which has developed very rapidly in the last few years is arc welding. Welding two pieces of metal together with an ordinary flame is accomplished by heating almost to the melting temperature the portions to be welded, joining them together and hammering them into a homogeneous joint as they cool. This requires a great deal of time and heat, and is extremely inefficient thermally. By means of the electric arc the operation is quickly and accurately performed, and only the metal adjacent to the surfaces to be welded is heated. The saving in time, labor and heat energy is enormous. Furthermore, there are many operations both of a repair nature and of a constructive nature which can be performed only with the electric arc. It is undoubtedly much better, from the point of view of fuel economy as well as financial economy, to repair an expensive broken casting, for instance, by the expenditure of a little time and electrical energy than to scrap it and spend a large amount of heat and labor to remelt and recast it.

Another application of electric heating which has recently grown rapidly is that of japanning, enameling and other forms of industrial baking processes. Here numerous conditions have been determining factors. Gas ovens of the kiln type were the rule. These were charged with the material on racks or carried in by hand. Control of temperatures and regulation of the atmosphere in the ovens were uncertain. Indirect heating was inefficient and direct heating introduced the products of combustion into the chamber containing the work and created undue air circulation, carrying dust particles onto the work. Usually the japan or enamel contained very combustible and volatile matter, and the fire hazard was great. The presence of the gas itself introduced fire and explosion risks. The introduction of electric heating made possible more accurate control of temperatures, better distribution of the heat, greater safety, better regulation of the atmosphere and also the development of continuous-process ovens. The result has been a better product, lower cost of production and greater efficiency of heat application. This has come about, even though, from purely thermal considerations on the basis of operations as they existed when using gas, it appeared that electricity would be from two to four times as expensive.

Industrial baking applications have been reported so frequently in the technical press that it is unnecessary to list them here. They extend from the baking of enamel on automobile bodies to the japanning of baby carriages, and from the setting of paint on washing machines to the baking of doll heads.

Similar conditions were found when the application of electricity to hot molding presses was investigated. For hot molding at temperatures above that obtainable from 80-lb. steam it had been customary to use gas. Combustion of the gas took place in holes in the press heads, and regulation of the temperature was extremely unsatisfactory. Electric heating was tried, and it was found that the uniformity of temperature regulation made possible a large saving in defective product which had formerly been caused by under- and over-baking. The value of the product thus saved was several times the cost of the electric energy consumed. It would have been unprofitable to have used gas even if it had cost nothing.

Limits of Successful Substitution of Electricity

In no case have there been wholesale substitutions of electricity for gas throughout any one industry. The problems of proper design of the electric heating equipment, coupled with those of application, have made it necessary to go slowly. Often a process must be handled in an entirely different manner to successfully use electric heat. Naturally those problems have been solved which offered the quickest financial returns to those interested in their solution. Other problems will follow the earlier developments as experience is gained. Changing conditions may also expedite development.

It is safe to say it is now possible to design electric heating apparatus satisfactorily for any application requiring temperatures up to 500 deg. C. (932 deg. F.), and that a larger number of installations is being operated commercially; that many operations requiring temperatures between 500 deg. C. and 900 deg. C. are being successfully performed; and that operations above 900 deg. C. and below 1230 deg. C. (2250 deg. F.) seem to be within the range of early possibility.

In the field of high-temperature electrometallurgical operations, such as refining of steel in induction or arc furnaces, much experience has already been gained, and there is available fairly good information as to

*From a paper by Frank Thornton, Jr., heating engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, read before the Engineers' Society of Western Pennsylvania.

power requirements and the value of the results. The increased value of the product justifies the expenditure required for new equipment as well as the cost of the power and other operating costs. There are many other processes to which electric heat is being applied for similar reasons.

There is a big application of heating, namely, heating of buildings. This has a seasonal requirement, having the period of maximum demand usually short and having a long period in the summer when there is no demand. It can be supplied economically by electricity only where the generating stations are without other load in the winter time. This occurs very rarely, but there are a few cases, such as occur in irrigated regions in which water is pumped by electricity which in turn is generated from water power. Here it is necessary to keep a load on the plant to prevent freezing in the winter, and this can best be accomplished by connecting a heating load to the lines.

Example Worked Out

In the discussion the author worked out the requirements for a japanning oven, 6 × 6 × 6 ft. Assume that the racks weigh 200 lb. and that the charge is 600 lb. of steel punchings; that the maximum temperature is 1400 deg. Fahr., and the initial temperature 60 deg. Then assume that the time period is 30 min. Varying conditions often determine these points. Under these conditions a japanning operation consists practically in bringing the temperature up only to the maximum temperature and then pulling the work out and putting in a new charge. That would give a simple problem. First, we must supply the energy lost by radiation. Assume that the outfit is operating, and do not take into consideration the initial heating-up period. If it is going to operate 10 hr. a day it does not make much difference whether it takes half or three-quarters of an hour to bring it up to temperature. Second, we must supply ventilation. Third, we must supply absorption, both in the charge or work and in the racks. The first item is dependent upon the construction of the oven. If the oven has just an iron frame and sheet-iron sides with no insulation, it will have a big radiation loss. With improved insulation it will cut down the loss in proportion. We will assume that it will be insulated and that the radiation loss might amount to 30 watts per hour per square foot. At this rate 216 sq. ft. would radiate about 6 kwhr., or about 8 hp. The ventilation will, of course, also depend on the quality of the work, how dry it is when put in and various other factors. It might amount to six changes of air per half hour. We will assume that it is 4 kwhr.

Regarding absorption in the load. We have 600 lb. of material and 200 lb. of racks—or 800 lb. of iron to be heated from 60 to 400 deg. every half hour. That means a temperature rise of 340 deg. The specific heat is approximately 0.125, or 1/8, and 340 × 800 × 1/8 equals 34,000 B.t.u., or about 10 kw. hr. This is for a half hour, which gives a total of 20 kw. hr. of electricity input. The total input for absorption, ventilation and radiation is thus about 30 kw. hr. Such electric heating apparatus is usually operated on 440 volts or less.

The other part of the question, as to the uniformity of the power and the character of control, would depend on the character of this baking load. If it were a simple baking operation—bringing the material up to baking temperature and taking it out—it would be controlled by a thermostat set at maximum temperature to throw the current off; or it might turn the power on and off to maintain the temperature constant for a certain length of time if that were necessary. The form of the control would depend on the condition of the process and the rapidity with which the charge is to be reloaded, and those factors would in turn determine the total amount of power.

H. O. Swoboda, consulting engineer, Empire Building, Pittsburgh, suggested in the discussion that if an electric furnace or any other appliance is added to a plant which is already in existence, and this furnace is operated at a time during which the capacity of the power-plant is not taxed to its maximum by the motors, lights and other appliances, then the actual cost of the electrical energy delivered to the furnace is made up of nothing but the additional consumption of fuel, plus an insignificant percentage for wear and tear of the equipment. Wages, salaries, interest on the investment and depreciation of the equipment need not enter in such a case into the cost of the electrical energy for the furnace, as these items were incurred and fully charged as a part of the cost of that energy which is consumed by the other equipment. This method of determining the cost might, of course, be called a discrimination in favor of the furnace at the expense of the other equipment, but the fact nevertheless remains that the costs established in this manner are mathematically correct. The freight rates of railroads and the rates for electrical energy charged by the central stations are built up on the very same principle, and should the railroads and central stations attempt to apply the same rate for all different customers and consumers, they could not exist—a fact which is well established.

Mr. Thornton added that few factories make use of the graduated charge, depending on the character of the load, in different applications or in different departments. It is done in some cases in large factories where they have a great variety of supply and the expense of serving different departments may be different. This is something, he said, that might well be considered in connection with the furnishing of power by generating plants in manufacturing establishments, to various departments, in order to equalize the cost accounting.

Electric Rivet Heating

H. P. Smith, power engineer, McClintic-Marshall Co., Pittsburgh, told of an investigation for a substitute for natural-gas-fired rivet-heating furnaces, which included a test of an electric furnace. The cost of heating with electricity compared favorably with the present practice. This did not take into consideration any improvement in the product. The thermal efficiency when heating rivets is about 50 per cent. This is low on account of the door of the furnace being opened frequently. When used for heat-treating steel and melting non-ferrous metals, this furnace reaches 90 per cent thermal efficiency. Temperatures above 2500 deg. F. are readily obtained. The electric furnace in which the rivets were heated is 6 ft. long, 30 in. wide and 18 in. high, and has three doors at the front. Seventy rivets, weighing 45 lb., were heated to the proper temperature for driving in each compartment every 15 min. The furnace required 40 kw.

The electric furnaces, he said, are equipped with auto-transformers, having the high-tension side wound for 440 volts and the low-tension side wound for the voltage to suit the furnace, which in this case was about 60 volts. The furnaces have no vents, and, where the operation permits, the doors are kept closed and there is no change of air with an accompanying loss of power. Besides operating on as low cost as with fuel-oil, an additional saving is made when the furnaces are used for the purpose for which they are particularly adapted, that is, heat-treating steel and melting copper and precious metals. The estimates were based on energy at ½c per kilowatt-hour. The electric-furnace load-factor is unusually high, and the power factor 100 per cent. At the time the electric furnaces were under consideration a low rate for energy could be obtained for the above reasons.

The heating element in this furnace was a semi-circular trough of 4 in. radius and about 4 ft. long, having an electric terminal at either end and filled with graphite. The current from the auto-transformers passes through the graphite, causing it to become incandescent. The loss of graphite, due to oxidation in furnaces used for rivet heating, was estimated to cost 30c per ton of metal heated. When operating with the door closed the loss of graphite by oxidation would be very much less, he pointed out. The furnace has an arched roof and the heating is indirect. The walls are insulated, and after the furnace had been in operation six hours, the walls of the furnace were but slightly above the room temperature.

COKE INDUSTRY IN COLORADO

Developments at Colorado Fuel & Iron Co. and Other Centers—Oven Walls of Concrete

The metallurgical fuel of Colorado, Utah and New Mexico has been a very tardy member in the caravan of Western industrial progress, says F. C. Miller, Trinidad, Col., in a paper, "Development of the Coke Industry in Colorado, Utah and New Mexico," to be presented at the Colorado meeting of the American Institute of Mining Engineers in Denver, Col., in September. The history of Western coke has naturally been closely related to the development of the metallurgy of iron and steel and the precious metals in Colorado.

After briefly discussing the early history of the smelting of lead and other metals in that territory together with the fuel problem, the author continues in part as follows:

On Jan. 23, 1880, the Colorado Improvement Co. consolidated with other companies to form the Colorado Coal & Iron Co., with Gen. William J. Palmer at the head. In 1881, this company erected a small iron and steel works at Bessemer, which has grown into the present Minnequa Plant of the Colorado Fuel & Iron Co. The early plant employed 900 men; the present one, over 7000 men. The Colorado Coal and Iron Co. never made a success with its steel venture at Bessemer, the principal cause of failure being inferior coke, which contained 40 per cent ash, had no strength and was too fine.

The reorganization of the Colorado Coal & Iron Co. in August, 1896, to the present Colorado Fuel & Iron Co. resulted in the improvement of its coke. Washeries, at that time, were not a staple on the market, and consisted chiefly in very costly experiments. Sopris was the first coke plant to have a fairly efficient washery. In 1899, the company purchased the patent right to the Forrester plunger jig, which became the standard unit for all of the washeries built in rapid succession in the years 1900 to 1902.

In this period, a great many standard batteries of double-bank 13-ft. ovens were constructed by the Colorado Fuel & Iron Co. and by coal companies operating in New Mexico and Utah. Previous to 1898, there were approximately 1600 coke ovens operating in these States without a single coal washery. At the end of 1902, there were 5900 coke ovens in operation, with 12 coal washeries. That short period will undoubtedly go down in history as the "coke age" of Colorado, Utah and New Mexico.

Utah and Dawson Fuel Companies

The Utah Fuel Co. erected ovens at Castle Gate, in 1888, to take care of the Montana trade, but after a brief period of operation, it was found that the coking property of the coal was rapidly deteriorating as the mine developed. An exhaustive examination of the property controlled by the company resulted in the discovery of coking coal at Sunnyside. This does not possess uniform coking qualities, and it is necessary to disintegrate the slack to a fineness of ⅛ in. before the best results can be obtained. Slack from this mine is low in impurity, yielding coke carrying about 12 per cent ash.

In 1900, the Dawson Fuel Co., operated by the Phelps-Dodge corporation, at Dawson, N. M., erected 95 double-bank 13-ft. ovens and a washery, which gave the usual inefficient results. After a few years of experimenting, they constructed an all-steel washery and assembled units of double-compartment jigs, concentrating tables, centrifugal driers, and appliances which make this washery second to none in the United States. In 1905, they erected 480 under-flue ovens, 13 ft. in diameter, of the bee-hive type, but the spent gases are carried through flues under the oven floor before going to a central spent-gas main leading to tall stacks. The hot gases are passed under boilers, but the system is so arranged that they can by-pass the boilers on their way to the stacks, or the boilers can be fired by hand. A great saving in boiler fuel is accomplished by this form of oven construction, and the coke has a structure suitable for copper smelting. The product of these ovens is extracted with the Covington machine.

The Colorado Fuel & Iron Co., experimented with a similar oven, called a stack oven. This was of the bee-hive type, but the gases passed through flues under the floor and then up through a stack. The object was to coke the charge from the bottom up and from the top down in one operation, and reduce the time of coking from 48 to 24 hr. After several years of practice, the system was abandoned because there was not sufficient heat under the floor to make a dense coke; there was more sponge on the bottom of the prisms than on the top.

Oven Walls of Concrete

E. H. Weitzel was appointed general manager of the fuel department, Colorado Fuel & Iron Co., in 1908, and began an active development in oven construction. The results show conclusively that reinforced concrete walls, without batter, are superior to stone. The retaining walls of the ovens constructed at Cokedale by the Carbon Coal & Coke Co., operated by the American Smelting & Refining Co., are reinforced concrete; they have been operating about 10 years with practically no repairs to the retaining wall.

The Covington coke extractor was introduced to offset the rapid decrease in available oven labor. It met this condition with a margin of profit in favor of the machine and, at the same time, the structure of the product was improved by making straight 72-hr. coke. The Koehler ovens, operated by the St. Louis, Rocky Mountain & Pacific, at Koehler, N. M., installed machines in 1915.

In 1909 Mr. Weitzel shipped samples of coal to Joliet for a test in the Koppers by-product ovens; the results were not satisfactory. In 1910, samples were shipped to Glasport, Pa., to be tested in the Otto Hoffman by-product ovens; these tests were not all that could be desired, but they showed that a part of the Western coal would make satisfactory coke in a by-product oven. In 1915 another series of tests was made in the Koppers by-product ovens, and the results proved satisfactory.

The H. Koppers Co., of Pittsburgh, has erected 120 ovens at Minnequa, Col.; they are divided into two batteries, and have a coking capacity of 46,000 tons per month; each oven is 40 ft. long, 10 ft. high and 19 in. wide. It is presumed that the coking period will be between 16 and 18 hr. There is no definite decision as to the ultimate recovery of by-products. Provision has been made at this time for the use of the excess gas, recovery of ammonium sulphate, recovery of tar and oils, and a special plant for benzol recovery. An approximate cost of $5,000,000 will cover the ovens, coal washery, benzol plant, coke-screening plant and various appliances.

[The original paper gives a table of the physical properties of Western coke as made by the Colorado Fuel & Iron Co., the Victor American Co., the Dawson Fuel Co., the St. Louis, Rocky Mountain & Pacific Co., the American Smelting & Refining Co. and the Utah Fuel Co.]

Import Licenses for Italy

WASHINGTON, Sept. 3.—The War Trade Board announces that a decree published by the Italian Government, effective July 1, 1918, forbids the purchase abroad and importation into Italy of any material or product without an import license from the Italian Government. Applications for licenses to import into Italy any commodity of foreign origin must be filed by the Italian purchasers with the Giunta Tecnica Interministeriale, Rome, before the placing of orders abroad. After licenses to import have been granted by that body, the orders may be placed abroad.

Shipments of chromite from the Quebec chromite mines are increasing and the output this year will be considerably larger than that of 1917. The output last year was 35,726 tons valued at $495,981. The demand for chromite continues excellent, in fact it is impossible to satisfy the requirements.

Crane Hoist Type of Industrial Truck

A fleet of industrial trucks of the crane hoist type has recently been shipped by the Baker R & L Co., Cleveland, to Eastern plants. These trucks are designed to take care of unwieldy articles which cannot be trucked by hand or transported by the overhead traveling crane economically. Numerous safety devices are included in the construction of these trucks, and they may be operated by elderly men and boys and in some cases women. One of the points upon which special emphasis is laid is the interchangeability of 98 per cent of the parts of this truck with similar parts on the various other types of trucks built by this company.

Industrial Trucks of the Crane Hoist Type Are Being Used in Inter-Departmental Haulage for Handling Articles Which Are Too Unwieldly for Hand Trucking and Cannot Be Transported Economically by a Traveling Crane

The crane hoist truck is of the two-wheel drive and steer type, and as soon as pressure is released from the automatic switch pedal, the motor circuit is opened and the brakes are applied. The movement of the pedal before the motor circuit is completely opened gives a partial application of the brakes, and as soon as the circuit is entirely interrupted, the braking operation is automatically completed. Once the automatic switch has operated, it is pointed out that it cannot be closed until the controller is in the neutral position, since the switch pedal and the controller handle are mechanically interlocked.

Device for Recording Travel of Motor Trucks

An instrument for recording the daily history of a motor truck has been brought out by the Service Recorder Co., East 105th Street and Quincy Avenue, Cleveland. In designing the recorder, advantage is taken of the fact that a motor truck, or in fact any vehicle in motion, sways from side to side, independently of any vibration due to its operation. Only two elements are used in the device, a pendulum mass with a recording stylus set near its point of suspension and a chart. The pendulum mass swings from side to side in response in the side sway of the moving vehicle, and as the chart rotates at clock speed the pendulum can mark a record which indicates this movement and the time at which it occurs, while the absence of any record shows when the vehicle is standing still.

Following an address by W. H. Workman, general manager Handley-Page Airplane Co., London, England, before a joint meeting of the Chamber of Commerce and the Manufacturers' Association of St. Louis, steps have been taken for the construction of a Handley-Page airplane at St. Louis with the view that if it fulfills the predictions made for it a plant be built at St. Louis for the manufacture of the planes on a large scale.

Shipyard Riveting and Punching Machine

A new special type riveting machine designed especially for use in shipyards has been brought out by the Hanna Engineering Works, 1765 Elston Avenue, Chicago. In addition to driving rivets 1 in. in diameter with a single stroke of the piston the machine also can drive a punch which will cut holes of the same diameter in ⅝-in. material.

The machine follows the builder's standard type of construction for riveting machines and uses a combination toggle and lever action which is relied upon to upset the rivet completely in the hole, thus forming a tight head and following the shrinkage of the rivet with the full rated pressure of the machine until a set is secured. The toggle action, it is explained, builds up the pressure at the dies during the first half of the piston stroke and then merges into a combination toggle and lever action which is relied upon to maintain the toggle alignment and pressure while the die travels through the final half of the stroke.

Holes 1 In. in Diameter Are Punched in ⅝-In. Material and Rivets Driven in Them by a Combined Riveting and Punching Machine Recently Developed for Use in Shipyards

To facilitate the punching operation a dashpot mechanism is provided which takes up the forward thrust of the plunger when the punch shears through the material. A forged steel nose or lower stake which can be readily removed by loosening the set screw holding it in place is provided. This nose is relied upon to enable the operator to work in very close sections such as bulb angles and bent ship channels.

BUILDING A SHIP

How the More Than Half a Million Men Are Employed

WASHINGTON, Sept. 3.—More than half a million men are at work on the record-breaking shipbuilding program of the United States. Such an aggregate of men and capital has never before tackled this problem. All is being done under the supervision of the Shipping Board and the Emergency Fleet Corporation. The shipyards alone employ 300,000 men and 250,000 the board's gigantic program.

Sixty per cent of the labor, says an official account of the details of this work of building an American merchant marine, is used in constructing the hull and 40 per cent in the making and installation of the mechanical parts that operate and run the ship. The story of the work they do is particularly interesting because of the great demands that are being made upon less essential trades to recruit the ranks of these more important workers.

The important trades which help to build a ship of steel are the following: Shipfitters, blacksmiths, riveters, chippers and calkers, drillers, plumbers, pipefitters, machinists, joiners, carpenters, pattern makers, foundrymen, coppersmiths, heavy forgers, sheet metal workers, furnace men, shearers, punchers, anglesmiths, shipwrights, riggers, flangers, drop forgers, erectors, bolters-up, crane men, locomotive engineers, firemen, loftsmen, laborers, painters, and helpers in all these trades. In the actual construction of the hull of the ship the more important trades employed are: Loftsmen, shipfitters, drillers, riveters, chippers and calkers, shipwrights, riggers and shopworkers.

Large Part of Loftsmen

Loftsmen play a large part. The plans of the ship, as made in the drafting room, are drawn to small scale. These are sent to the mold loft — a large building with a smooth floor of sufficient size to have drawn upon it the plans of the ship to full size. This is the work done by the loftsmen. The lines of the ship consist of three different plans called the sheer plan (side elevation), the half breadth plan and the body plan (end elevation). These three plans give the shape of the ship. From them templates or molds can be made by the loftsmen. These templates or molds are light wooden or paper patterns from which the steel for the various parts of the hull can be laid off and marked for shearing, punching, planning and other operations.

The plan most used in making templates is the body plan—which shows the shape of each frame, beam and floor plate—and this usually is marked off on a special section of wood flooring (called the scrieve board) and cut into it permanently with a service knife. Among the duties of the loftsmen are: to lay down and fair the lines on the mold loft floor, to make the scrieve board and the various molds or templates for the parts of the hull. This work requires much experience, skill and the highest kind of mechanical training.

Marking Steel Material

Probably the one metal worker whose trade may be said to be purely a shipbuilding trade is the shipfitter. His work consists in marking off the steel material for different parts of the ship's hull. This is done usually by means of a template lifted or marked off from other parts already in place on the ship. In some cases the material is marked off directly without the use of a template, from dimensions taken from a blueprint or other plan.

Drillers are used extensively. Workmen of this class do both drilling and reaming. This is because a large portion of the rivet holes in the different parts of a ship are punched in the shop before the parts are erected, but in some cases the holes must be drilled on the ship. When the parts that are punched are fitted in place, in spite of the most careful workmanship, it will usually be found that many of the rivet holes in connecting pieces do not come quite fair, that they overlap slightly. These unevennesses are removed by reaming, which consists in slightly enlarging the holes so as to make them fair and perfectly cylindrical so that they will be completely filled by the rivets. Riveters do a spectacular work in the construction of a ship and the rat-a-tap of the pneumatic driving force they use in their work has a fascination like the anvil in the old village blacksmith shop. Each rivet must be driven carefully, exactly as called for by the plans. When the ship is designed each and every rivet is specified.

Chippers and Calkers

Chippers and calkers are used to trim off or smooth up the edges of plates, castings and other parts. This is done by the shippers using hand or pneumatic tools. These same workmen, usually, are also engaged as calkers. Their duty is to calk the edges of plates, angles, rivet heads and other parts to make them watertight. This is done after the rivetting is completed.

Shipwrights are the men who install wood decks, wood foundations for capstans, winches, guns and other parts. They also do the work of making and installing wooden masts, spars, booms, etc. They also have considerable work to do in connection with the preparation of launching ways, building blocks, shores, wedges and parts of similar character. Their work is distinct from woodwork or stateroom fittings, furniture and other woodwork of similar nature that is done by the joiners.

Riggers work in the manufacture and installation of shrouds, stays, lifts, braces, life lines and other rigging fitted to the masts, spars, booms and other parts of the ship. Some of this rigging is made of steel wire rope, some of hemp or manila rope. The riggers must be able to do splicing, seizing, serving and parceling.

Workmen employed in the shops of a shipyard comprise a variety of trades. For example, a large amount of the woodwork of a ship is done in the shop by the joiners. Ventilation, piping and all light metal plating work is done largely in the shop by the sheet metal workers. Plumbing and piping work is done to a large extent in the shop by the plumbers, machinists and pipefitters. Forgings for a large number of miscellaneous fittings and other parts of the ship are made in the shop by blacksmiths, drop-forgers and heavy forgers. Much of the work on wiring and electrical fittings is done in the shop by electricians.

The shop work on the hull proper, or the fabrication, as it is sometimes called, is done by the workmen who operate the shears, punches, bending rolls, planers and other shop machines, and the frame benders, acetylene burners, furnace men and angle-smiths who do the work necessary prior to erection on keel plates, shell plates, brackets, clips, beams, bulkhead and deck plating, stiffeners and other parts required for the hull of the ship.

To Charge for Boxing and Crating

To aid in the conservation of the lumber as well as to avoid the handling of unnecessary tonnage on the part of the railroads, the Detroit Copper & Brass Rolling Mills, Detroit, has announced that unless there are specific instructions to the contrary, it will hereafter ship material loose or unboxed where in its opinion it is safe to do so. Where boxing or crating is necessary, a charge is to be made to cover the lumber and labor cost involved. One point that the company makes is that under existing conditions it does not find it practical to adjust selling prices to absorb the expense.

A new service-restoring relay system has been developed by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. It is intended primarily for use on the lines from central power plants. The arrangement of relays is intended to minimize the interruptions caused by transient short-circuits, which clear themselves as soon as the circuit breaker has operated.

GREATER TOOL-STEEL CAPACITY

Mills Adding Furnaces to Keep Pace with Demand—Producer-Gas Plants Insure Operations

Manufacturers of high-speed and alloy tool steels are constantly adding new capacity in mills, forge shops and furnaces in an effort to prevent supply from falling further behind demand, but the growth of urgent need for war essentials is now substantially greater than last spring, when it was 1000 per cent greater than before the war, and it continues to increase without any sign of let-up. Some plants are experiencing trouble in securing steel and other materials for plant additions, but the greatest trouble is in maintaining a sufficient supply of common labor about the plants. All mills of this character are short of unskilled workers, although the Government, wherever possible, is sending men to them right along. Those mills near shipbuilding plants along the coast continue to experience great trouble in preventing workmen from quitting to enter the shipyards. So far as skilled labor is concerned, it has proved fortunately stable, and the policy of the Government has been to see that it is undisturbed as far as possible.

Despite the pressure on mills for output, the intense summer heat has made working conditions around the furnaces well-nigh intolerable. One manufacturer reports that even the installation of 6-ft. fans before the furnaces and other efforts to alleviate working conditions in these departments of its plant have failed to afford any marked relief. The result has been that workmen refuse to show up at such times or are able to work, when so inclined, only with greatly reduced efficiency. Men pulling crucibles from the furnace, for example, are compelled from time to time to drench the entire body with water to endure the heat. The result has been a greatly reduced output of tool and alloy steel; and production in some plants during the recent week of hot weather approached a standstill.

To prevent another disastrous mill shut-down this winter, similar to that caused a year ago by fuel shortage, most high-speed and tool steel plants have installed producer-gas equipment and are accumulating coal reserves that will guarantee the full operation of their plants next winter regardless of railroad embargoes, breakdowns or reduced mine output. Under virtual Government operation, no difficulty is being experienced in securing supplies so far as alloys and raw steel supplies are concerned, but the crucible steel makers are still limited as to the shipment of plumbago from Ceylon. Both the supply of crucibles and their quality are therefore far below par. It is stated that no cargo of plumbago has arrived at New York in nearly three months.

As all orders for high-speed and alloy steels are for AA, or for first priority war work, the only problem is a sifting and sorting of essential orders on the books in order to ship to manufacturers in the best sequence to aid war production. Recent Government regulations are reported to have eliminated the confusion as to priorities which caused so much trouble to makers of high-speed and carbon tool steel a few months ago. Deliveries vary according to the size and shape of tool steel needed, and on some grades of high-speed steel are two to three months behind demand.

In Cleveland Territory

The demand for tool steel in the Cleveland territory is very active, apparently having become heavier during the past few weeks. The call is largely for high-speed tool steel. The capacity of plants is insufficient to meet the demand and some makers are unable to produce their maximum output because of the shortage of labor, raw material and other conditions that interfere with production. Shipments are irregular because of car shortages. Some manufacturers have reduced their output of carbon tool steel and are devoting their attention more to the higher priced high speed grades. Mill shipments on high speed tool steel are promised within two to six weeks. Makers are unable to keep their mill and warehouse stocks replenished. Warehouse stocks with most makers are very low and some are out of many sizes. Most buyers are placing orders from warehouse stocks so as to get better deliveries and in many cases are taking other sizes when sizes they want are not available.

Makers of tool steel are demanding tools which will enable them to secure the maximum production and are generall asking for high-speed steel. The call for high-speed tools for Government work is tremendous. Heavy demands are coming from the shipyards in the Central West and the consumption by the twist drill manufacturers is very heavy. There is also a strong demand from the munition makers, motor truck and airplane manufacturers and an active demand at present for railroad shop requirements. The demand is also active from machine tool plants and from small machine shops that are doing Government work.

Most of the orders for tool steel are accompanied by priority certificates, but sellers are accepting orders not accompanied by these certificates provided the steel is needed for war essential work.

A Universal Heavy-Duty Tool Holder

For handling the forged steel cutting tools required by the heavy lathe operations now being performed, the Watts-Myers Tool Co., Los Angeles, Cal., has brought out a special form of universal tool holder. Although designed for holding steel ranging from ¾ x ¾ in. up to 1 x 1¾ in. in size, it is pointed out that holders in which various forms and sizes of inserted cutters are used can also be accommodated. Another feature upon which emphasis is laid is that the holder is particularly adapted to work requiring more than one operation, since it is possible to mount two cutters at the same time.

Two Forged Steel Cutting Tools Ranging from ¾ x ¾ to 1 x ¾ In. in Cross-section Can Be Mounted in a New Tool Holder for Heavy Duty Work

The holder is designed to give a holding surface measuring 5 in. in length to the cutting steel and a spiral spring at each end automatically raises the top plate from the tool when the nut on the stud bolt is released. In this way, it is pointed out, the holder is always in position to receive the various sizes of tools, while when it is fastened down on the compound rest it forms a rigid holding device that will not slip, chatter or gouge the work. A taper plate at the bottom of the holder is provided and by being revolved enables the cutting edge of the steel to be raised or lowered ½ in. either above or below the center line of the work.

Swedish Pig Iron and Ore Exports

Pig-iron exports from Sweden in the first quarter of 1918 were 43,400 tons as compared with 41,400 tons in the first quarter of 1917. Exports of ferrosilicon were 4500 tons against 4400 tons to April 1, 1917. Iron-ore exports, which all went to Germany, were only 347,000 tons in the first three months of 1918 as compared with 803,000 tons in the same three months in 1917. This is a decrease of nearly 60 per cent.

The Dominion Government will undertake the construction of terminals on the Songhees Reserve, Victoria, B. C., and will lay 70 miles of steel rails on Vancouver Island.

Would Extend Aid to Many Industries

Chairman Baruch Hopes to Save Companies from Bankruptcy, as They Will Be Needed After the War—Federal Reserve Board Expected to Act

WASHINGTON, Sept. 3.—As forecast last week in this correspondence, the War Industries Board has started the machinery to attempt to meet the financial difficulties resulting from the ever-growing retrenchment orders against thousands of American industries.

It is easy enough for the War Industries Board, with its machinery of priorities and preferences, to force these plants to cut down their output or to quit business entirely. Nor is there any question of warrant for this procedure. Just as men must sacrifice their peaceful pursuits at home to respond to the draft call to the army, so they must be prepared to sacrifice their plants, if necessary to help win the war. There is not enough of material, or fuel, or labor, or transportation to go around. Industries must be put on a war basis. And for some of them this means stopping their wheels entirely.

But when this stoppage comes it means hardship. For many it means bankruptcy and industrial death. And it is this which the War Industries Board is trying to avoid, for dead industries are a menace even in war. Dead factories are perilous to live ones. There is a contagion about death. And when peace comes, and these factories are needed again to put the nation on a peace basis, it will be impossible to resuscitate them.

So Chairman Baruch of the War Industries Board is trying to work out a program which would enable these plants to live, by Government help if need be, until the war is over. It is to be machinery that would chloroform them instead of killing them, to leave them dormant but alive until the war is over.

Chairman Baruch's Suggestion

The first public statement on this important problem came from Chairman Baruch, who announced that he had suggested to the Federal Reserve Board that it work out some plan under which financial aid might be extended to industries that would be hit by the war in the industrial curtailments that are now under way and are to come. Mr. Baruch warned that curtailments would be necessary in increasing proportions as the war needs grew. His purpose, he said, in appealing to the Federal Reserve Board for development of the plans to extend financial aid to industries that must be skeletonized to get maximum production from war industries was to soften the blow on the weakened industries and prevent their being wrecked.

Just how this is to be done has not been worked out. It is not a simple problem. Chairman Baruch has only taken the first step by presenting the problem to Governor Harding of the Federal Reserve Board in a letter asking that body to take it up. Governor Harding has not yet responded, and it is doubtful whether he will be able to make any definite suggestions until his board —now two members short—can study the details of the complex problem. As it is, there is some doubt just how far it lies within the jurisdiction of the Federal Reserve Board. Many of its features are part of the domain set aside for the War Finance Corporation, and that body is expected to participate in the discussion. It is likely that all three—War Industries Board, Federal Reserve Board and War Finance Corporation—will take up the matter in some detail, and that both President Wilson and Secretary McAdoo of the Treasury will participate in the final decision.

Federal Reserve Board's Part

As far as the Federal Reserve Board is concerned, it is pointed out that its part in solving the problem will lie largely in its influence with the banks of the country to treat such curtailed corporations gently in helping them to meet their financial demands. It is, of course, easy to see that, if these corporations, pushed to the verge of bankruptcy by curtailment orders and restrictive regulations from Washington, default on their bank paper, it will be a difficult time for the banks that hold it, and in turn for the Federal Reserve institutions whose circulation is largely built up on just such commercial paper. With the present large issues of Federal Reserve notes, that question becomes doubly acute. So it is up to the Federal Reserve Board to use its skill and influence in trying to find a solution which will protect both banks and the industries.

One suggestion is that the Reserve Board establish a new class of rediscount rates on bank loans of a year or more to permit member banks of the Federal Reserve system to negotiate these long-time loans. At present, six months is the maximum period for which rediscounts are permitted.

Not an Easy Problem

The problem of skeletonizing an unessential industry so it can live until the end of the war is by no means easy. Wherever possible, efforts are being made to convert them into war industries. In some lines, this is not so difficult. In the automobile industry, for instance, the War Industries Board believes that Jan. 1, 1919 will find most of the automobile factories busy on 100 per cent war orders. It is not so difficult to convert plants of that kind. Sometimes it takes money to do so and a way ought to be found by which it can be supplied through the War Finance Corporation. That probably will be done. The new Facilities Division of the War Industries Board and the Commission on Resources and Conservation will do much to help meet these problems.

But there will always remain unconvertible factories. Their employees will have no difficulty in finding new places, for the work or fight orders of the draft boards are recruiting them rapidly either for the army or for essential industries. Most of their stocks, especially of steel and raw materials, will find quick markets and at good prices. Some of their machinery may also find a ready sale for essential uses.

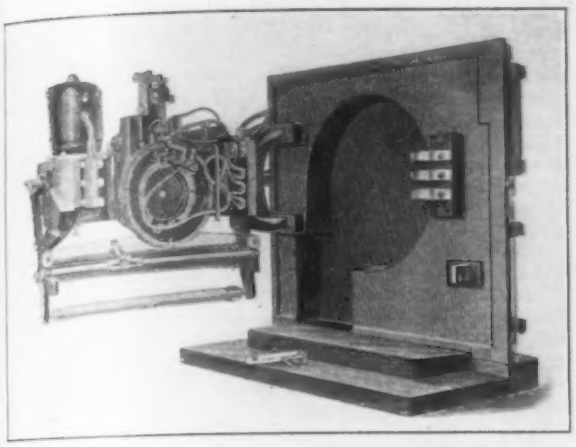
But the plant itself, the good will, the trademarks, designs, patents, and a thousand other tangible and intangible assets would be wrecked by bankruptcy. And it is this phase of the situation which demands attention. The action of Chairman Baruch is an important step, and it is expected that the pressure of the War Industries Board will hasten a decision on the part of the other two boards which are concerned in the search for a solution. It is even possible that Congress may have to be asked for help, although there seems little doubt that the great powers which have been given the President by various war measures of Congress ought to enable the executive departments of the Government and the various war organizations to meet all needs.

Japanese Imports of Steel in 1917

Imports into Japan of various steel products in 1917 were much larger than in 1916 and 1915. Plates and sheet imports were 296,816 tons in 1917, as compared with 159,881 tons and 77,569 tons in 1916 and 1915 respectively. Pig iron and ingots are reported together as 235,221 tons in 1917 and 243,182 tons and 173,883 tons in 1916 and 1915. Large quantities of bars, rods and shapes were imported in 1917, when they were 221,243 tons, but only 161,268 tons in 1916 and 68,082 tons in 1915. Of galvanized sheets the 1917 imports were 4285 tons or a little less than those for 1916. Tinplate imports in 1917 were 26,635 tons as against 38,993 tons and 26,495 tons in 1916 and 1915. Rail imports last year made a record at 50,671 tons. In 1916 they were only 4344 tons and in 1915 8920 tons.

Power Operated Type of Pyrometer

A line of power driven instruments for measuring and controlling temperatures has been brought out by the Leeds & Northrup Co., Philadelphia. These instru-

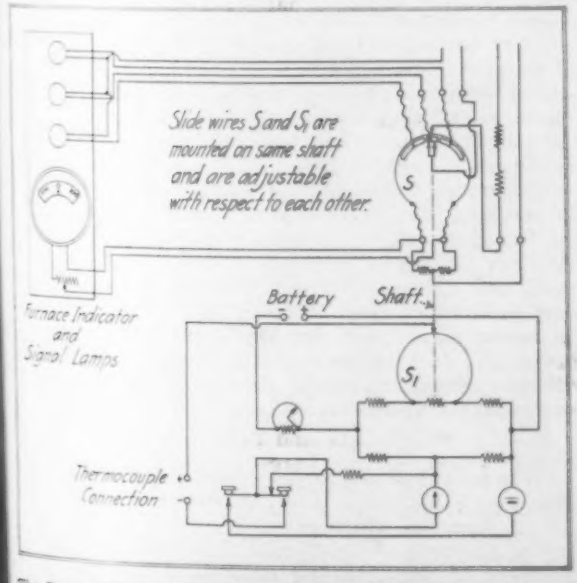


Ease of Access to All Parts Characterizes a Power-Operated Curve Drawing Recorder of the Potentiometer Type in Which the Adjustments of Resistance to Give a Balance Are Made Automatically

ments are of the potentiometer type in which the adjustments are made automatically, and the galvanometer determines merely the direction in which the adjustment is to be made, the pointer or boom serving only as a mechanical trigger.

In these instruments a reciprocating part which is kept in constant motion by an electric motor is arranged so as not to strike the boom when the latter is in the central or no-current position. As soon as the boom moves in either direction the reciprocating part pushes it against another which adjusts the potentiometer circuit, the amount of the adjustment being regulated according to the distance that this boom has swung which, of course, is in proportion to the amount of unbalancing current passing through the galvanometer. In addition to making these adjustments the motor possesses sufficient power to operate the chart drum, a special governor of the centrifugal type which operates by opening and closing a shunt in the field circuit being provided to insure a constant speed. Power to move the recording pen is also provided by the motor. In the multiple recording instruments which will give records for a number of different thermocouples or resistance thermometers, the motor operates the selector switch which connects the recorder to the different circuits and simultaneously turns the printing wheel that impresses a dot on the sheet to record the reading and a number to identify the circuit which is being measured.

Where it is desired to have the signalling of the temperature variation done automatically at the furnace, a single point or curve drawing instrument is provided with contacts on the moving element. These light the signal lamps according as the temperatures in the furnace are too high, too low or correct, and an interesting modification of this is to use two thermocouples in different parts of the furnace and provide the recorder with a commutator to enable first one circuit and then the other to be read. The chart produced is a single line running back and forth between the two temperatures, thus indicating the difference graphically. Among the points upon which information can be secured in this way are the effects of an empty, full or partly loaded furnace, how rates of firing and location of load affect the distribution of heat and door, cold hearth and other losses. If desired, instruments capable of handling as many as 16 different circuits can be secured.

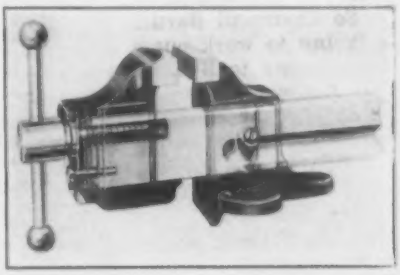


The Recording Potentiometer Can Be Installed in Connection with an Indicating Instrument and Set of Colored Lamps at the Furnace to Insure Accurate Temperature Control

A Quick-Action Machinists' Vise

As a substitute for the standard pattern bench vise in which the jaws are opened and closed by a screw and nut, the Velox Vise Co., Inc., Lowville, N. Y., has brought out a quick-acting type. A solid rectangular steel bar is substituted for a hollow section rectangular gray iron casting and the operating screws are used only to secure the final adjustment.

In operation the screw head is lifted slightly to release the front jaw from the bar and enable it to be moved forward or backward. After the work has been inserted the front jaw is again raised and pushed against the work, the screw then being tightened in the ordinary way to grip the work securely. For releasing the work the screw is loosened slightly, it being pointed out that a partial turn in either direction is all that is necessary to grip or release the work.



Raising the Front Jaw Slightly Enables It to Be Moved in Either Direction, the Screw Being Employed Only for the Final Tightening of the Grip on the Work

The use of a narrow steel bar provides greater clearance in the throat of the vise, which it is explained is an advantage where deep work is being handled, as well as being practically unbreakable. If the bar should slip in the rear jaw at any time, adjusting screws, one in either side of the vise body, can be tightened, care being taken to see that both screws bear evenly upon the bar.

Vacuum Cleaner Conservation

Representatives of manufacturers of power-driven portable vacuum cleaners have agreed with the Conservation Division of the War Industries Board to reduce their lines to not more than two models or sizes, to discontinue the manufacture of less essential attachments and discontinue use of metals where not absolutely essential. These plans will result in an annual saving at least 100 tons of steel, 5 tons of brass 125 tons of aluminum and 1,000,000 ft. of rubber hose.

Steps are being taken at Cleveland for the formation of a local section of the American Society of Mechanical Engineers. The matter is in the hands of a committee consisting of E. S. Carman, chairman; Robert I. Clegg, secretary, J. H. Herron, and A. H. Bates, all of whom are directors of the Cleveland Engineering Society. The new organization will also be the mechanical engineering section of the Cleveland Engineering Society.

French Maximum Prices for Iron and Steel

Maximum prices for iron and steel are in force in France. The French Ministère de l'Armament et des Fabrications de Guerre has issued the following regulations according to which:

When iron and steel products are sold by a merchant they are to be sent from the works direct to the consumer, and the price to be charged to him must not exceed by more than 3 per cent the price at which they are sold by the maker.

When iron and steel products have already left the works they must not be sold at a higher price—except in the case specified here under paragraph four—than that fixed in the tariff of the Iron Merchants' Association (published below), whether the goods are sold through a merchant or not. The holder of the goods may requisition his stock if not satisfied with the price.

With a tolerance of 5 per cent in respect of the assignment (chiffre d'affaire) of each merchant, no iron or steel products may be sold without a voucher (bon) of the purchaser, countersigned by the purchasing bureau (service preneur) and the bureau for metallurgical products (service contrôleur), such voucher constituting an "authority for manufacture." No such permits for sale or manufacture can be issued unless the voucher clearly indicates the net price at which the products are sold to the buyer.

Retail merchants, who do not buy goods direct may charge 10 per cent as a maximum over and above the tariff referred to above. They may sell without countersigned vouchers, but no delivery is to exceed 200 kilograms (about 4 cwt.).

Tariff of the Iron Merchants' Association

For a description of the various classes of products enumerated below under divisions A and C, the tariff refers to the standard classifications issued for merchant iron and steel, and special products by the Comité des Forges de France.

A.—Merchant Iron and Steel Bars and Various Shapes.—The basis price for these is £34 per metric ton at par exchange for class 1, the differentials or extras rising by 50 centimes (about 5d.) to £35 for class 6. For the two categories of products outside the classification the extra price is 28s. and 36s., respectively, above basis price.

B.—Plates and Sheets.—For plates and sheets 5 mm. (0.2 in.) thick and over, the basis price is £37 8s. per metric ton For thinner sheets the extras rise to £2 4s. above basis price for sheets 1 mm. (0.04 in.) thick.

C.—Hoop Iron and Steel.—The basis price for hot-rolled hoop iron and steel is £40 per metric ton with extras rising to 36s. per metric ton for category over 6, over and above basis price.

Imported Steel

As regards common steel goods placed at the disposal of France by the British Government, the distribution of this material is entrusted to the Comptoir d'Exportation des Products Métallurgiques under the control of the Ministère de l'Armament, for whom the Comptoir acts as agent. The distribution is to be made according to instructions given by the Commission Interministérielle des Métaux et des Fabrications de Guerre (C.I.M. for short) who will release the material at the prices given hereunder. The Comptoir is selling the steel without any profit, and all surplus moneys realized by the sales will be handed over to the French Treasury. The classification of the goods is the same as in the Iron Merchants' Tariff above, but the basis prices are different, as under:

Division A.—For merchants the basis price is £31 per metric ton delivered at the railroad station in France, to which the steel is consigned; for industrials the basis price is £29 f.o.t. at the French port of landing.

Division B.—For merchants the basis price for plates and sheets 5 mm. (0.2 in.) thick and over is £34 delivered free at consignee's railroad station; for industrials the basis price for ordinary sheets, 3-16 in. thick and less, and for plates and sheets, 3-16 in. thick and over, is £30 f.o.t. at French port of landing.

Division C.—For hot-rolled hoop steel the basis price is £36 delivered free at the French railroad station for merchants, and £35 f.o.t. at French port of landing for industrials.

Division D.—As regards special classes of steel, such as spring steel, drawn steel, boiler plates, etc., as it is impossible to fix an average price for all these, every industrial will be charged the exact purchase price plus charges for freight, insurance, customs, carriage, loading and unloading with an additional ½ per cent to cover general expenses of the central distributing body.

Differentials.—The extra prices for steel in division A are the same as in the Iron Merchants' Tariff. As regards B, for sheets of less thickness than 5 mm. (0.2 in.) the extras are also the same as those in the same tariff, but only for merchants. For industrials a special schedule, approved by the Ministère de l'Armament, has been issued. Nothing is stated about C.

Vouchers.—Vouchers for steel controlled by the C.I.M. can only be dealt with if they clearly indicate the net price at which the steel is to be invoiced to the purchaser.

To Form a National Federation of Manufacturers

Warren C. King, president Manufacturers' Council of New Jersey, which is now affiliated with the Manufacturers' council of New York, announces plans for the formation of a National Federation of Manufacturers' Councils to embrace the entire United States. The plan and scope of this federation will be different from that of the National Association of Manufacturers and will be patterned on the plan of organization of the American Federation of Labor, embracing the principle of local organizations in all manufacturing communities, these to form part of the State councils and the State councils to be merged into the national federation.

Announcement is expected to be made within a few weeks of the calling of a national convention of manufacturers from every State having large manufacturing interests for the purpose of creating in each State a Manufacturers' Council and from these councils to elect representatives who shall form the National Federation.

Mr. King in his formal statement outlining the program says: "We desire to form the National Federation, not with the idea of combating labor, but with the idea of co-operating with labor." Mr. King may be reached at 72 Front Street, New York.

Evening technical courses in engineering, chemistry, physics, drawing and other subjects are again announced by the Polytechnic Institute of Brooklyn, N. Y. The term for most of the courses begins Sept. 30. A booklet on the subject has been issued and can, of course, be had for the asking.

Magnesite Industry in 1918

According to R. W. Stone of the U. S. Geological Survey the production of magnesite in the six months ended June 30, 1918, was about 93,700 net tons. The California output is estimated at 47,600 tons of crude magnesite and the Washington output at 46,100 tons. The rate of production in California is about 50 per cent less than in 1917, and the rate in Washington is about 88 per cent of that of last year.

The increased freight rate and the importation of magnesite from Canada have greatly reduced the demand for California magnesite for use as a refractory material, so that all the small and some of the large producers have stopped work, and the others are operating with reduced force. The Canadian magnesite, which comes from Grenville, Quebec, is crystalline, but it carries a high percentage of lime. Extensive masses of Canadian magnesite average from 7 to 10 per cent of lime. It can be delivered by boat to Buffalo, Cleveland and Chicago at much lower cost than magnesite can be brought from California and Washington, and is being substituted for the higher grade domestic material. In 1917 we imported 2148 tons of Canadian calcined magnesite, and in the first five months of 1918 we imported 5809 tons.

The output of the copper mines of Serbia before the war was 5335 tons in 1910, increasing to 7600 tons in 1913. Since the war began the mines have been worked in the interests of the Central Powers, under the management of Austrian and German engineers. The deposits are extensive, and the ore contains from 6 to 9 per cent of copper.

BRINELL HARDNESS TEST*

New Method Insuring Quick Commercial Results of Sufficient Accuracy

The present types of Brinell machines generally follow the original Brinell principle of forcing a ball of standard diameter into the steel under test by means of a standard load hydraulically applied. Several seconds are required to bring the full load to bear upon the ball and test specimen, and several more are used in maintaining this pressure, according to approved practice.

Under laboratory conditions, where time is not so important a factor as accuracy, the present types of machines are entirely satisfactory. There are cases, however, where testing must be done on a large commercial scale, as in the acceptance of raw material, and where the hardness range permissible does not require tests of laboratory accuracy. In such cases the rapid and approximate determination of the hardness of thousands of pieces is more important and productive of better results than the extremely accurate testing of a limited number whose hardness, unfortunately, is not always representative of the lot as a whole.

With the idea of overcoming this objection and of making possibly a simpler machine which, while not possessing the accuracy of the ordinary Brinell machine, would be capable of giving results that would be satisfactory for tests on a commercial scale, the writer has conducted experiments which have led to results far more encouraging than he had hoped. While the final form of the machine, including the necessary mechanical details, has not yet been developed, a description of the principle involved and the results obtained in the various experimental tests may prove of interest.

Use of a Standard Impact

Instead of applying a standard dead load as in the ordinary Brinell machine, a given or standard impact was used. It is of course impossible to choose a standard impact that will produce the equivalent Brinell impression in a steel of any hardness, but for a given Brinell hardness it is possible to determine empirically the impact required to produce an impression identical with the one produced by the standard Brinell machine. It was decided to choose that impact which gives a 3-mm. diameter impression in a steel of 418 Brinell hardness. This impact would therefore give the same result on a steel of this hardness as the standard Brinell machine using a 10-mm. ball and a 3000-kg. load. A cylindrical 10-kg. weight with a cone-shaped lower end was used, in which the standard 10-mm. ball was fastened securely. Fig. 1 shows this. The proper height from which the weight should fall to produce a 3-mm. diameter impression was determined experimentally by raising it to various heights by means of a supporting wire and hand crank and then severing the wire. This height was found to be 70 mm., and the impact would therefore be 0.700 m-kg. Using this impact as a standard, specimens of various Brinell hardness were tested by this device and the diameters of the impressions obtained were plotted as ordinates against the standard Brinell machine hardness numbers as abcissas. Fig. 2 shows the results obtained.

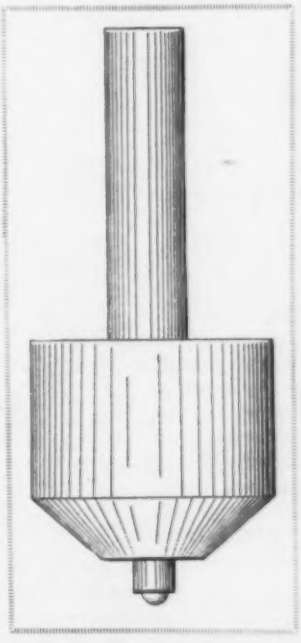


Fig. 1.—The 10-Kg. Cylindrical Weight with a Cone-Shaped Lower End in which the Standard 10-mm. Ball Is Set

As it is sometimes advisable to use a lighter load than 3000 kg. with the standard Brinell machine, it was decided also to try the effect of a lesser impact. Instead of taking one-half the standard impact of 0.700 m-kg., that height of fall was determined which would give a 3-mm. diameter impression in a steel of 209 Brinell hardness using the same 10-kg. weight and 10-mm. ball. In other words, the new device would give the same result on a steel of this hardness as the standard Brinell machine using a 10-mm. ball and 1500-kg. load. This height was found to be 36 mm., giving an impact of 0.360 m-kg. The results of tests made on steels of different Brinell hardness are shown in Fig. 3.

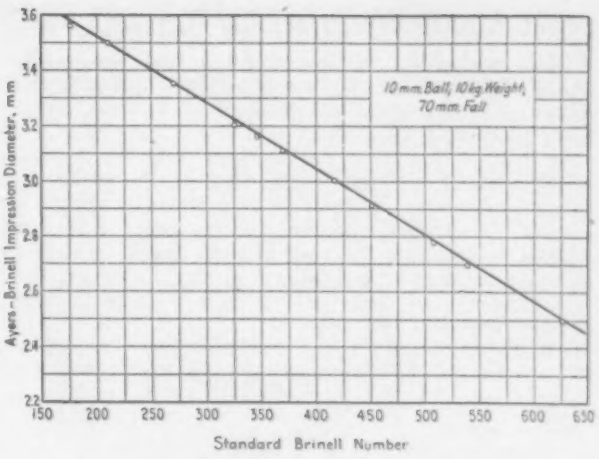


Fig. 3.—Hardness-Impression Curve when the Fall Is 70 Mm.

In Figs. 2 and 3 the hardness-impression curve is practically a straight line and the points experimentally determined fall as closely to this line as could be desired, considering that in no case does their deviation from the line amount to a greater distance than that corresponding to the error involved in the microscopical determination of the diameter of the impression. Repeated tests gave excellent checks in all cases and showed that this method is consistently accurate and free from erratic tendencies. Each determination can be read directly in standard Brinell numbers by the use of the table, the data for which has been obtained from Figs. 2 and 3.

By hypothesis the hardness-impression curve of the standard Brinell machine would pass through that of the "Ayers-Brinell" machine at a hardness of 418 and 209 (standard Brinell) in Figs. 2 and 3 respectively. This serves as a convenient means of checking the latter machine with the standard machine by using test specimens of this hardness.

As in the case of the standard Brinell machine, there are certain limitations to all ball hardness testers. In those cases in which the metal is extremely hard a

*From a paper presented at the annual meeting of the American Society for Testing Materials at Atlantic City, by J. G. Ayers, Jr., metallurgist, Hyatt Roller Bearing Co., Newark, N. J.

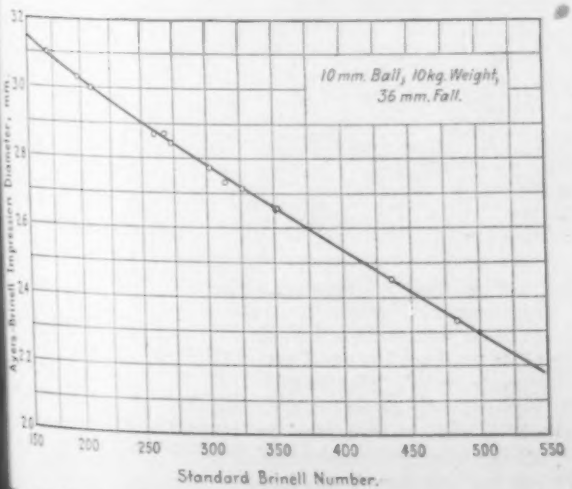


Fig. 2.—Hardness-Impression Curve when the Fall Is 36 Mm.

permanent deformation of the ball results. Where the test specimen is soft, the ball penetrates so closely to the supporting surface or anvil that the hardness of the latter affects the results. Small narrow specimens of hard steel crack under test and soft narrow ones permit of an easy lateral flow which affects the accuracy of the test. Fortunately, with the exception of thin pieces such as sheets, none of the above cases are so extremely common as to materially curtail the use of the Brinell machine. In the case of thin soft sheets, by reducing the load to 1000 kg. or by reducing the size of the ball consistent results can be obtained; with the device described it is necessary to use a smaller ball and less impact.

In the standard Brinell machine there are only two factors which can be varied, namely, the load and the size of ball. In the device described the weight, the height, and the diameter of the ball may be varied. Just what values will eventnally be assigned to these factors has not as yet been determined.

Table of Brinell Hardness Numbers for "Ayers-Brinell" Machine

10-mm. Ball; 10-kg. Weight

Diameter of Ball Impression, mm.	Hardness Numbers. 36-mm. Fall	70-mm. Fall	Diameter of Ball Impression. mm.	Hardness Numbers. 36-mm. Fall	70-mm. Fall
2.00	629	838	3.00	209	418
2.05	608	817	3.05	188	397
2.10	587	796	3.10	167	376
2.15	566	775	3.15	146	355
2.20	545	754	3.20	125	334
2.25	524	733	3.25	104	313
2.30	503	712	3.30	83	292
2.35	482	691	3.35	62	271
2.40	461	670	3.40	41	250
2.45	440	649	3.45	20	229
2.50	419	628	3.50	...	208
2.55	398	607	3.50	...	187
2.60	377	586	3.60	...	166
2.65	356	565	3.65	...	145
2.70	335	544	3.70	...	124
2.75	314	523	3.75	...	103
2.80	293	502	3.80	...	82
2.85	272	481	3.85	...	61
2.90	251	460	3.90	...	40
2.95	230	439	3.95	...	19

In designing a machine upon the principle described it is possible to have it either hand or power operated. The weight can be raised and tripped at as rapid a rate as the samples can be supplied and removed, so that it will work if required with the regularity of a shear or punch press. The cost of manufacture will be less than that of the standard Brinell machine, since there are fewer accurately machined parts required, and this together with the rapidity with which tests can be made should, in the writer's opinion, create a useful field for a device of this nature.

New Electrode Plant in Norway

A new plant to make electrodes in Norway is announced. It is located at Frederickstav, and is to produce both carbon and graphite electrodes and to be operated by the Norske Elektrodeverker. The capacity is 4000 tons of carbon or 1000 tons of graphite electrodes a year. The same general standards and sizes of graphite electrodes are to be manufactured as those used throughout the United States. American engineers and machinery experts have been engaged to conduct the work and the machinery is almost exclusively of American manufacture. Previous to the war most of the electrodes imported into Norway came from Italy, Sweden and the United States, but for some time now they have come almost solely from the United States.

On July 1 the International Nickel Co. of Canada began to treat matte at the new refinery at Port Colborne. A large quantity of matte from the Copper Cliff smelter has been shipped to the refinery and supplies of all kinds are now on hand, and one furnace is in operation.

The business of the Cary Spring Works, New York, owned by the late Mrs. R. Anna Cary, will be continued by Edward M. Cary and Florence Cary under the management of Edward M. Cary. Mrs. Cary died Aug. 20.

Post-War Development of Iron Ore in Brazil

That the Brazilian iron mining industry is to be extensively developed after the close of the war appears from a report of the *Monitor Mercantil* of Rio de Janeiro. Many important iron-ore deposits are said to have been acquired by foreign and Brazilian syndicates. The original report gives a list of the more important iron property owners, which includes 18 different companies. Important among them are the following:

The Itabira Iron Ore Co., an English concern, with its head offices in London, incorporated by Rothschild, Baring Bros., and E. Sassel, and which purchased the "Conceiçao" and "Esmeril" deposits for 2,400,000 milreis (about $600,000 in American currency). This group has control of the Victoria Minas Railway. These deposits, situated at Itabira de Matto Dentro, are estimated at 99,000,000 cu. m. and capable of producing 296,000,000 tons. The purchase price paid by the prior holders was but 400,000 milreis ($100,000).

The Brazilian Iron & Steel Co., an American corporation, represented by M. Harder, has acquired also in Itabira de Matto Dentro the deposits known as "Caná" and "Sant' Anna," containing 33,000,000 cu. m. or over, or 132,000,000 tons. The purchase price is stated as 300,000 milreis (about $75,000). This organization has also purchased the "Alegria" and "Cota" deposits, situated in the municipality of Santa Rita Durao (Marianna), for the sum of 150,000 milreis (about $37,500). These deposits are reported to be capable of producing 10,000,000 tons. The same organization also has a concession to construct a railroad operating between the mines of Santa Rita Durao (Marianna) and S. José da Lagon.

The Minas Geraes Iron Syndicate, an American company, organized by Phel. Hartemback, Ernest Moser and John Hammond, has purchased the deposits of Paracatú and Bananal, situated in Cattas Altas and in Santa Barbara.

The Deutsch Luxemburgische Bergwerks und Hütten Aktiengesellschaft, a German company, purchased the Corrego do Feijao deposit, situated in Piedade do Paraopeba (Villa Nova de Lima), for the sum of 100,000 milreis ($25,000). The deposit is at present being prospected by an engineer named Westerma.

The Canadian Metallurgic Co., which is said to be making plans for an electric smelting furnace on Governor's Island in the Bay of Rio de Janeiro, capable of producing 500 tons of steel daily, has acquired a manganese mine at S. Joao d'El Rey, and also certain iron deposits.

It is reported that the Itabira Iron Ore Co., which owns immense deposits in Itabira de Matto Dentro, with more than 100,000,000 tons of iron ore running from 68 to 70 per cent in iron, will, soon after the war, exploit these deposits. The plan is to construct a branch line of the Victoria & Minas Railway, which is under that company's control, to transport the ore to tidewater. The plans of this company are as follows: To install modern machinery in the mines for the extraction of large quantities of ore; to extend the railroad to the mines at Itabira de Matto Dentro, and to construct a fleet of vessels specially built to discharge the mineral automatically at the destination in Europe and to be suitable for transporting coal from Europe to Brazil.

A law consisting of a single clause came into force recently in Germany, says the London *Iron and Coal Trades Review*, repealing section 153 of the Imperial Industrial Code, which provided that whosoever by physical force, threats, insult or defamation, should persuade or endeavor to persuade another person to take a part in or give support to any agreement or combination for demanding better wages and conditions of work or should endeavor to prevent another person, by like means, from withdrawing from such an agreement or combination was guilty of an offence entailing liability to three months' imprisonment or to such severer penalty as might be due under the criminal laws.

The Cutler-Hammer Mfg. Co., Milwaukee, manufacturer of electric controlling devices and allied apparatus, announces the opening, on Sept. 3, of a branch office in the Union Trust Building, Fifteenth and H Streets, N.W., Washington. H. W. Knowles and C. W. Yerger, engineers, will be located at this new office, which will be operated to serve the Government and others having occasion to require information regarding the company's products.

RIGID COKE INSPECTION

Low Grade Fuel Must Be Stopped, Says Director Blauvelt

UNIONTOWN, PA., Sept. 2.—Commencing in the coke region, the Government has started tightening its supervision of war industries with a view of securing steel in sufficient quantities to bring the war to a successful conclusion in the summer campaign of 1919. Warren S. Blauvelt, coke director for the United States Fuel Administration, at a conference with the operators of the Connellsville coke region last Thursday announced the establishment of a rigid supervision of all coke shipments to insure the quality of the product and made no secret of the fact that it was but one step in a plan already drafted in Washington to stimulate the country's steel output to such a quantity that the American and allied forces would be given sufficient war material to end the war in 1919, or at least hasten the day of victory.

As head of the coke inspection of the department, R. C. Glazier had been chosen by the Fuel Administration, Mr. Blauvelt announced. He told the operators that Mr. Glazier was already at Washington mapping out his campaign and that within a short time it would be unprofitable for a coke operator to ship a low grade coke. Mr. Glazier went to Washington from Johnstown where for many years he was employed by the Cambria Steel Co. He is a chemist and practical furnaceman and is an expert on coke.

Poor Coke Shipped

Frankly stating that the establishment of the coke inspection department was distasteful to the Fuel Administration, Mr. Blauvelt declared that the step had been made necessary by the shipment to the furnaces of coke which was found to contain a rather large percentage of ash and dirt. The present measures, the coke director stated, were adopted to correct that evil and if sufficient results were not forthcoming a basic price for low grade coke was in prospect. That price will be $5 per ton, he asserted, with the $6 price maintained as the basic price for first grade coke.

Establishment of the coke inspection department was one step forward in the program for bringing the country's steel output up to something approaching requirements, he told the operators. He stated that the blast furnaces were not producing metal in proportion to the quantity of coke delivered and that thorough investigation of that condition had brought out the fact the deficit was mainly caused by the quality of coke. He pointed out the wastage in labor, transportation facilities, and the loss in steel resulting from shipment of coke liberally mixed with ash and dirt and said it was time to call a halt.

"We absolutely cannot permit poor coke to go to the furnaces," declared Mr. Blauvelt, "which reduces their output when the war depends upon that coke. We have already taken steps along those lines and I can tell you now that there will be no profit in low grade coke."

The Washington Conference

Mr. Blauvelt told the operators of a conference last week of the country's leading steel men which he attended at Washington. After all requirements had been cut down, to a minimum, he stated, the output for the present year still fell short of the demand by from 3,000,000 to 4,000,000 tons. With requisitions coming in daily from General Pershing for more steel now that the American army is on the advance, such a condition he asserted brought the country face to face with one of the greatest problems of the war.

"There is little doubt in the minds of all well informed officials," Mr. Blauvelt declared, "that the war can be won in 1919 if we can get the steel there on time. Whether the war shall be won within a minimum of time and loss of life or whether it drags along a couple of years is now mainly dependent upon steel."

TAX BILL REPORTED

Senators Show Disposition to Oppose Features of House Measure

WASHINGTON, Sept. 3.—After more than three months of preliminary work, the long awaited $8,000,000,000 war tax bill was presented to the House of Representatives to-day by Chairman Kitchin of the Ways and Means Committee.

Actual debate is not to begin until Friday. The committee members believe the bill can be passed by Sept. 15, but they are not very sanguine about that, for all their predictions as to the speed of the committee's own work failed. The country had been promised a completed bill some time last July. There is, however, no concerted opposition to the bill in the House. The Republican members of the committee have worked with the Democratic members throughout the preliminary sessions, and have agreed to abide by the committee decision as a whole. They have reserved the right to make individual opposition, but none of them is expected to carry this far enough to impede the passage of the bill.

Senate Hearings Limited

The House held a long series of hearings on the bill, but the difficulty with the value of the testimony taken lay in the fact that the witnesses had to testify on general questions and no opportunity was given them to deal with concrete instances of the bill itself. This weakness is to be cured by the hearings which the Senate Finance Committee will begin this week. To save time the committee has decided to hold hearings without waiting for the bill actually to be passed by the House. The witnesses here will have an opportunity to present their views on the actual details of the completed House bill. The Senate has given signs of considerable opposition to much of the House measure, and the testimony to be taken will figure later in the Senate debates. The Senate committee will hear only one witness for each industry and an effort will be made to limit the hearings to 10 days.

The bill as presented to the House affects practically every person and every corporation doing business in the United States. As would be expected from a bill that seeks to raise $8,000,000,000, it doubles and trebles and quadruples taxation bills. Much of the tax is sought to be raised from war business and war profits, but it is by no means confined to these sources. It does not, however, levy any consumption taxes.

Excess Profits Tax

As an alternative to the excess profits tax in the present law, the new bill levies a distinctly war profits tax. This is to be a flat 80 per cent levy on the net income above the $3,000 exemption and a deduction of 10 per cent of the invested capital added or withdrawn since the close of the pre-war period. This war profits tax is not to exceed 35 per cent in the case of corporations the invested capital of which for the taxable year is not over $25,000 and 40 per cent maximum for concerns of $50,000 invested capital, in order to protect smaller concerns. The war profits tax and the excess profits tax are to be applied as alternatives, according to which will produce the greater revenue. The excess profits tax is to be 35 per cent of the net income up to 15 per cent of the invested capital, 50 per cent on profits between 15 and 20 per cent and 70 per cent on net income exceeding 20 per cent on such capital.

The bill codifies all income tax levies, including a normal tax of 12 per cent and surtaxes running up to 65 per cent. Under the existing income tax law, individuals and partnerships pay supertaxes on their total annual profits up to the present maximum rates of 60 per cent. Corporations pay only the normal tax and stockholders pay the supertax on two-thirds of the annual profits which are retained in the business. Under the normal corporation income tax of 18 per cent in the pending bill, with a rebate of 6 per cent for distributing its profits, a corporation would pay 6 per cent more normal tax on the two-thirds of its profits retained in the business.

ESTABLISHED 1855

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Bridgeport's Outlaw Strike

For the first time in the history of the National War Labor Board's efforts to settle industrial controversies, a group of workers has called a strike in protest against an award handed down by the board. It is an outlaw strike because it is not recognized by the officers of the International Union of Machinists. The meeting at which the strike vote was cast was called by the local union but was an open meeting and the strike vote was a voice vote and not the secret ballot called for by union rules. It is a strike against the Government and against the higher officials of the union and not against the employees who had voted to accept the award.

It brings up again that old question of how the employers can safely deal with an unincorporated body which cannot be controlled by its own officers—a body which may at will regard an agreement as a mere scrap of paper. The men involved in the strike are the men whose leaders appeared before the National War Labor Board and agreed to abide by its decision. The men struck because the award did not give them the type of classification demanded, together with the high vocational minimum that such classification would make possible. The umpire saw fit to deny the high minimum because he accepted the reasoning of the manufacturers that so to do would be to invite disruption of production that would be vital at this time.

The original submission of the employers was carefully worded to include only the matter of wages. The board imposed the eight-hour basic day and a local board of six members to settle all disagreements that might arise in the administration of the award. It affirmed the right of collective bargaining and the right of the workers to join trade unions, although it did not set forth the machinery by which collective bargaining was to be established. If there had been no strike, the employers would probably have accepted these obnoxious features.

There are slightly more than 4000 men on strike out of a working population of 35,000 affected by the award and a total working population of 54,000. Because of the loud clamor of this comparatively small portion of the workers in Bridgeport, all the objectionable features of the program of organized labor are imposed upon the employers by the award. The workers have been assured by Joint Chairman Walsh that the award establishes the machinery by which they can later secure such working conditions as may properly be granted to workers—in other words, that they can secure classification and high vocational minimums. Yet they struck.

The answer lies in the wage portion of the award. The group of men now on strike were long before the controversy getting wages that were generally higher than were warranted by the advance in the cost of living; in many cases, they were getting more than the 78c. an hour established as the recognized maximum by the award. In this feature lies the real cause of the strike—because the men who were originally responsible for the trouble were denied the right to increase their weekly earnings beyond the point where a serious charge could be made of wage profiteering. To make the matter worse in their eyes, common and unskilled labor, upon which the pressure of present economic conditions rested hardest, were given a much-needed advance. The umpire and the board were undoubtedly influenced in their decision by the authenticated figures presented by the employers, which showed that skilled labor had been advanced far more than the cost of living had advanced, but that the unskilled and common labor had not been so advanced.

There is warrant for saying that employers in industries that have always operated under open-shop conditions are beginning to lose faith in the National War Labor Board. They look with fear upon the many decisions that almost unfailingly open the door to and deliberately encourage the unionization of plants that have peacefully operated open shops for long periods. They ask, Can the War Labor Board control the forces it has let loose upon essential industry? The Bridgeport strike is the strike of a labor mob that has passed beyond the control of its leaders. At their meeting they jeeringly asked the local leader to read some more telegrams from Washington. Several examiners and field agents of the War Labor Board were present at the meeting and when they were asked to speak they were bluntly told from the floor that the meeting had something better to do than to listen to Govern-

ment employees. They were compelled to sit silent, although to them was assigned the task of administering the award.

The Government has several effective ways of bringing employers into line with its desires and decrees. It has no such ready recourse against labor. The way to get increased production is not to grant labor everything it wants. It is yet to be proved that the abolition of time studies, premium wages and the other methods of modern industrial efficiency has been of benefit to the country or to the workers. A way has yet to be found to keep workers steadily at their employment when they can earn as much in three days as they formerly earned in a week. The charge is often made that New England is rock-bound in its opposition to the methods of organized labor, but it should be remembered that in New England is Danbury, where the many idle factories and the hundreds of empty houses of that once prosperous city are a shining example of organized labor at its worst.

There are large factories in Bridgeport from which the strikers have been unable to pull a single man. They are without exception open shops. In one of the most important the employees voted to work a half-day Labor Day without pay to demonstrate their patriotism and to help the Government get field artillery quickly. It cannot be proved that the closed shop brings better co-operation between employer and employee. Why then in such abnormal times disturb the *status quo ante* or continue to introduce such controversial matters as the National War Labor Board has done in its Bethlehem, General Electric, Smith & Wesson and Bridgeport awards?

Trade Commission Gone Astray

The most important fact in connection with the arraignment of the Federal Trade Commission which the Chamber of Commerce of the United States last week laid before the President is that it is not a criticism of the law establishing the commission or of the commission's original program or early methods of procedure, but of the recent conduct of the commission and of its present policies or lack of policies.

In other words, the complaint of the national Chamber of Commerce is that the commission has gone astray. As justification for the departure one cannot recall any new legislation or any fresh instructions by the Executive. The change is plainly attributable, as the statement indicates, to the changes in personnel of the commission.

It is particularly unfortunate that the conduct of the commission should prove unsatisfactory, in spite of the fact that, with wide possibilities before it, a commendable course was adopted early in its history. The great danger was that of making a wrong start at the outset and when that danger was escaped it is especially regrettable that a departure from the right path should occur. That there were wide possibilities in the matter of policies to be adopted was well recognized at the time the commission was established. A fortnight after the formal organization of the commission, THE IRON AGE in the issue of April 1, 1915, discussed the subject, pointing out, regarding the members of the commission: "For instruction they have nothing but the law, and it is universally recognized that under the strict letter of the law widely different courses lie open to the commission." Then it was urged that, in substance, business men "get in touch" with the commission and co-operate with the members in their efforts to become familiar with American business.

The three and one-half years' history of the Federal Trade Commission is in striking contrast with the 30 years' history of the Interstate Commerce Commission. Changes in the personnel of the latter body have been very infrequent. The members have had time to learn. While the railroads at times have criticized the commission, in recent years they have not accused its members of ignorance of railroading. Steadily and scientifically the Interstate Commerce Commission built up a system of practices and a definite policy. There have been criticisms of the commission along various lines, but in the long list of criticisms of the Federal Trade Commission the Chamber of Commerce of the United States now presents, it is difficult to find any having even a remote likeness to such criticisms as have been made from time to time of the Interstate Commerce Commission. The commerce commission has not played to the galleries, its members have not sought political preferment, its policies have not been vacillating, it has not changed its methods of procedure without public notice, it has not been inaccurate or disingenuous in its reports to Congress, and it has not sought aggrandizement for itself or its members. Such charges and others are now made by a responsible body representing American business, and one is at a loss to imagine who possibly can step forth and undertake to deny the charges.

What the Chamber of Commerce of the United States asks as one important means of correcting the situation of which it complains is couched in very modest language, the filling of the two existing vacancies on the commission by able men "whose interests will be singly to the commission's work." A return to the policies and practices of the commission in its earlier time is desired. The President's original appointees, sent to the Senate Feb. 22, 1915, were: Edward N. Hurley, Joseph E. Davies, William J. Harris, Will H. Parry and George Rublee. The Senate confirmed the first four, while Mr. Rublee was named as a vacancy appointment.

Saving Manganese or Saving Steel

In far-away India marked attention is being devoted to the important metallurgical details essential to the making of quality steel in quantity. The testimony of Andrew McWilliams before the Iron and Steel Institute, as abstracted on other pages of this issue, contains most interesting facts as to what is being accomplished at the Tata works, particularly in basic open-hearth steel.

Mr. McWilliams advocates higher manganese content in all temper or special steels, particu-

larly rail steel. His experience shows that not only is the cleansing action in such practice more efficient and reliable and the fining effect on the pearlite more easily attained—both vital to the best steel—but there also results a metal which withstands the drop tests to a surprisingly better degree. Also the killing of the steel is superior. He advocates limits in manganese content of 0.70 to 1 per cent. Interesting corroboration of this are two important steels as castings which have attracted a good deal of attention recently particularly as to their shock resisting powers.

Another contention of the paper has to do with the method of adding the manganese to the steel It is refreshing to read such an argument for the additions in the furnace and not in the ladle. Not only do the results at Sakchi and elsewhere prove that the former method insures better heats, particularly for rails, but the formation of a better slag and the consequent essential reactions between bath and slag. More and more are the slag reactions being understood and their importance appreciated. For structural steels, however, the author favors the addition of manganese to the ladle.

Both the above points have been often discussed, but the methods suggested have not been put into practice on the scale warranted by their results, particularly in this country. A poor product, quickly made, is not conservation of steel, manganese or man power. While the practice above referred to necessitates the use of 20 to 25 per cent more ferromanganese, it is certain that the better product resulting is not only a saving of steel but perhaps of life. Much steel made with less manganese and going to scrap, means more manganese to make more steel—to say nothing of other losses.

The time must come when these vital facts will be fully recognized. They certainly merit serious consideration right now when there are advocates of less manganese in steel and lax methods in its use, to save manganese, instead of strenuous efforts to keep the production of manganese alloys to the highest point.

Basic Steel and the War

The importance of basic steel in warfare is emphasized in this paragraph with which Andrew McWilliams concludes his interesting discussion of the steel industry of India as given on other pages:

> The country that can make the best basic steel with regard to price, output and quality for the work it will be called upon to do, and can make the best use of it, has the greatest chance in war. War, so far as the steel industry is concerned, is an intensified phase of the peace struggle—tonic and educative in its effects. The nation that makes economically basic steel of the most suitable quality for the greatest portions of its demands assures high reputation, and the comparatively unlimited output that under present conditions can only be maintained in basic steel, conserves its acid material for the special purposes for which it is still found necessary or preferable, and thus has the best chance in peace times as in war.

Nowhere is there any close approach to the American output of basic open-hearth steel, for it is open-hearth steel that is referred to, since Bessemer steel, both basic and acid, is not suitable for munitions. Over 70 per cent of the total steel output of the United States was basic open-hearth in 1913 and 1914; the proportion is greater now. Most of Germany's steel is basic Bessemer. It was about 57 per cent of the total in 1913 and 1914 and basic open-hearth was not more than 40 per cent. In Great Britain the acid open-hearth output has always exceeded the basic.

If basic open-hearth steel can win the war, then there is no question as to the outcome. Certainly steel as steel plus man power is the predominating factor. Great Britain, by concentrating on war steel, has done remarkably, though for lack of man power has not increased output to the degree predicted. Her reliance has been largely on acid open-hearth steel, but basic output is constantly on the increase. Both Great Britain and France have drawn freely upon the United States, where much more steel is produced than in all the rest of the world. And now that this country is throwing all its resources in iron and steel into the war, the day of decisive advantage due to steel preponderance cannot be long delayed.

As the second steel-making nation of the world, preparedness has until lately given Germany the supremacy. She has had ample supplies of all forms of steel necessary. But there are signs that the flow cannot continue to be so free. In the past it has been the practice there to make gun forgings from the small amount of acid open-hearth steel derived from Swedish and Spanish ores and also from crucible steel. Ingots up to 80 tons each have been poured at Krupp's from crucibles alone. To-day electric furnace steel is going into German gun forgings. Information in the possession of the United States Government, obtained from analyses of German gun steel, points to such use of the electric furnace product. It is evident that resort is being had to every possible expedient, after four years of war consumption.

Not only is the war bringing forward new processes in industry but many improvements in older ones. Basic open-hearth practice before the war involved liabilities to defective steel, as it still does. But to-day in the United States highly satisfactory gun forgings are being made of basic open-hearth steel; further, most of our electric steel is refined on a basic bottom. Recent practice and investigation give other evidence that the basic open-hearth will make such a contribution to the winning of the war as to give it a new rank in the industry.

Puddlers' Wages Advanced

At the bi-monthly settlement of the puddling and finishing scales held at Youngstown, Ohio, on Saturday, Aug. 31, by committees of the Amalgamated Association and the Western Bar Iron Association it was found that the average selling price on shipments of iron bars in July and August was on a 3.40c. basis. This is one point higher than the May and June basis and entitles the puddlers to an advance of 25c. per ton or to $16.55 per ton for boiling for September and October.

Finishers receive an advance of 2½ per cent. The puddling and finishing rates are now by far the highest ever known in the bar iron trade. The sheet and tin plate scales for September and October will be fixed at Youngstown on Monday, Sept. 10.

LABOR QUESTION PARAMOUNT

Steel Manufacturers' New York Meeting Devoted to It Solely

On the invitation of President E. H. Gary of the American Iron and Steel Institute a meeting of fully 150 representatives of iron and steel companies and a number of consumers was held in the Waldorf-Astoria Hotel in New York on Wednesday, Aug. 28. Judge Gary addressed the meeting at some length, pointing out that the needs of the Government for steel for the manufacture of war essentials, not only for the remainder of this year but for the entire duration of the war had grown so large that some action was absolutely imperative by which the output of steel could be very much increased. He said that the keystone of the whole matter was labor, and the subject of labor was the only one discussed at the meeting. Also at the meeting was Felix Frankfurter, of the War Policies Board, who made an address. After a very full discussion of the labor question the matter was referred to the general steel committee, of which Judge Gary is chairman, and this committee will try to work out some plans by which the supply of labor at blast furnaces and steel works will be increased. Reports showed a great shortage in labor at all the pig iron and steel making centers, and this is getting worse. The next draft, for which registry is to be made on Sept. 12, will much further deplete the ranks of workmen, taking thousands of men into the army cantonments for training purposes who are now laborers at the blast furnaces and steel works.

At the conclusion of last week's meeting Judge Gary gave out the following statement:

"The iron and steel meeting to-day was attended by representatives of all the principal manufacturing concerns of the industry. There was considered the question of securing the largest possible production of steel for military necessities. With other matters, were discussed various labor problems.

"After careful deliberation, the whole subject matter, by unanimous vote, was referred with power to a committee composed of the members of the present General Committee of the American Iron and Steel Institute, as follows: Elbert H. Gary, chairman; J. A. Farrell, E. A. S. Clarke, C. M. Schwab, J. A. Topping, E. G. Grace, Willis L. King, J. A. Burden, J. A. Campbell, A. C. Dinkey, L. E. Block, H. G. Dalton and A. F. Huston."

Pig iron producers in two or three districts had conferences in connection with the meeting of last week, planning for the presentation of their request for an advance in the Government price. The steel manufacturers in class 3 are also making up their case, this class being composed of relatively smaller steel companies which buy pig iron in the market.

The conference between the general steel committee and the War Industries Board will be held in Washington Wednesday, Sept. 18.

Exports of American goods increased slightly in July as compared with June, while imports fell off slightly. Exports increased from $485,000,000 in June to $508,000,000 in July. For the seven months ended with July the foreign sales totaled $3,483,000,000 as compared with $3,661,000,000 for the corresponding period of the previous year. July imports were $241,000,000 whereas in June they reached a total of $260,000,000. For the first seven months of the year the imports were valued at $1,787,000,000 as against $1,779,000,000 for a similar period in 1917.

The Warren Steel Casting Co., St. Louis, has just completed the installation of a five-ton electric furnace and a five-ton open-hearth furnace.

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"The Iron Age" and Its Readers

Our readers are again indebted to the blast-furnace operators of the country for a very prompt report of pig iron production. With Sunday and Labor Day intervening, the gathering of the figures for August largely by wire on Tuesday, Sept. 3, and their final checking on Wednesday morning were only possible through the fine co-operation of representatives of nearly 400 furnaces. These are days when the trend of iron and steel output is narrowly watched, and statistics showing a falling off in pig iron in August are highly important.

It is the policy of the Department of Labor to have so-called war industries committees selected by employers and employees in all plants engaged on Government work. Whether it will accomplish its avowed purpose of speeding production or be the means of causing trouble, as a step toward collective bargaining, remains to be determined. The facts as to the Government's policy were given in our last issue.

In putting industries on a war basis, it may be necessary to recall a considerable number of skilled workmen who are now in the Army. A blank which it is necessary for an employer to fill out in order to have employees returned was published in THE IRON AGE of Aug. 29 and will be of interest to all employers.

Last week's issue contains the first illustrated description published of the Slick rolling-forging process.

PIG IRON OUTPUT FALLS OFF

Loss of 1000 Tons a Day in August

Production of 3,389,585 Gross Tons—372 Furnaces in Blast—Ferroalloy Output Near May Record

The pig iron production in August amounted to 3,389,585 gross tons or 109,341 tons daily, as compared with 3,420,988 tons or 110,354 tons daily in July, also a 31-day month. This is an average loss of 1013 tons a day, notwithstanding a net increase of nine furnaces during the month. In the same period of 1917, however, production fell off 3048 tons and was at the rate of only 104,772 tons a day in August, 1917, although six furnaces were added that month, giving 357 active Sept. 1, 1917. Active furnaces Sept. 1, 1918, total 372, blast having been started in 17 stacks in August and 8 having been blown out. The output of 54,009 gross tons of ferroalloys ranks next to the record production of 54,663 tons last May and is 2247 tons greater than that of July, formerly the next highest. Only 28,038 tons of ferromanganese was made, as compared with 29,996 tons in July.

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces in August and the three months preceding:

Monthly Pig-Iron Production—Gross Tons

	May (31 days)	June (30 days)	July (31 days)	August (31 days)
New York	237,044	222,908	229,424	219 040
New Jersey	24,339	26,990	25,588	17,049
Lehigh Valley	115,069	99,231	112,305	114,397
Schuylkill Valley	91,751	95,572	98,197	91,296
Lower Susquehanna and Lebanon Valleys	76,316	75,023	84,489	87,118
Pittsburgh district	695,794	686,658	707,023	687,433
Shenango Valley	177,911	166,036	161,548	177,204
Western Pennsylvania	199,604	190,596	200,511	182,315
Maryland, Virginia and Kentucky	96,472	90,769	98,334	90,423
Wheeling district	134,234	133,220	138,736	140,154
Mahoning Valley	330,627	296,585	293,627	292,759
Central and Northern Ohio	286,568	287,264	283,402	301,665
Southern Ohio	67,853	68,062	64,342	69,633
Chicago district	543,409	536,788	577,230	556,985
Mich., Minn., Mo., Wis., Col. and Wash.	125,437	114,566	113,487	112,473
Alabama	210,671	203,292	201,867	221,997
Tennessee and Ga.	33,413	30,231	30,878	27,644
Total	3,446,412	3,323,791	3,420,988	3,389,585

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from August, 1917, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
August, 1917	71,436	33,336	104,772
September	73,290	31,175	104,465
October	76,664	29 886	106,550
November	77,135	29,724	106,859
December	66,605	26,392	92,997
January, 1918	55,662	22,137	77,799
February	56,938	25,897	82,835
March	74,526	29 122	103,648
April	79,199	30,408	109,607
May	81,238	29,937	111,175
June	81,734	29,059	110.793
July	79,248	31,106	110,354
August	80,947	28,394	109,341

The new 600-ton stack built by the Mark Mfg. Co. at Chicago was blown in Aug. 24. Other furnaces put in blast include Northern in northern New York, one Bethlehem and Keystone in the Lehigh Valley, Vesta in the lower Susquehanna Valley, one Colebrook and Sheridan in the Lebanon Valley, Big Stone Gap and Oriskany in Virginia, McKeefrey in the Mahoning Valley, one Cleveland and one National Tube in Ohio, one Minnesota Steel in Minnesota, Tuscaloosa, one Sheffield, and No. 2 Bessemer in Alabama and Standard in Tennessee.

Furnaces blown out were one Wharton in New Jersey, Carbon in the Lehigh Valley, Emporium in western Pennsylvania, No. 8 South Chicago (new) and one Gary in the Chicago district, Irondale in Washington, Shelby in Alabama, and one Rockwood in Tennessee.

Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of steel-making iron month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Total production			Spiegeleisen and ferromanganese		
	1916	1917	1918	1916	1917	1918
Jan.	2,251,035	2,244,203	1,756,208	24,866	38,792	30,695
Feb.	2,183,845	1,829,846	1,620,254	23,877	32,137	26,114
Mar.	2,365,116	2,285,430	2,349,419	29,388	36,563	39,122
Apr.	2,316,768	2,370,937	2,411,488	31,862	39,595	35,511
May	2,408,890	2,404,380	2,513,577	35,844	37,701	54,633
June	2,295,784	2,304,155	2,407,166	38,597	30,829	44,844
July	2,306,303	2,369,630	2,456,693	31,353	43,884	51,762
Aug.	2,313,122	2,214,513	2,509,357	33,338	29,492	54,009
Sept.	2,309,710	2,198,705	.....	29,451	42.235	.....
Oct.	2,530,806	2,376,589	.....	34,566	48,691	.....
Nov	2,404,210	2,349,545	.....	44,975	34,688	.....
Dec.	2,294,620	2,094,659	.....	43,470	29,902	.....

Capacity in Blast September 1

The following table shows the number of furnaces in blast Sept. 1 in the different districts, also the number and daily capacity in gross tons of furnaces in blast Aug. 1:

Coke and Anthracite Furnaces in Blast

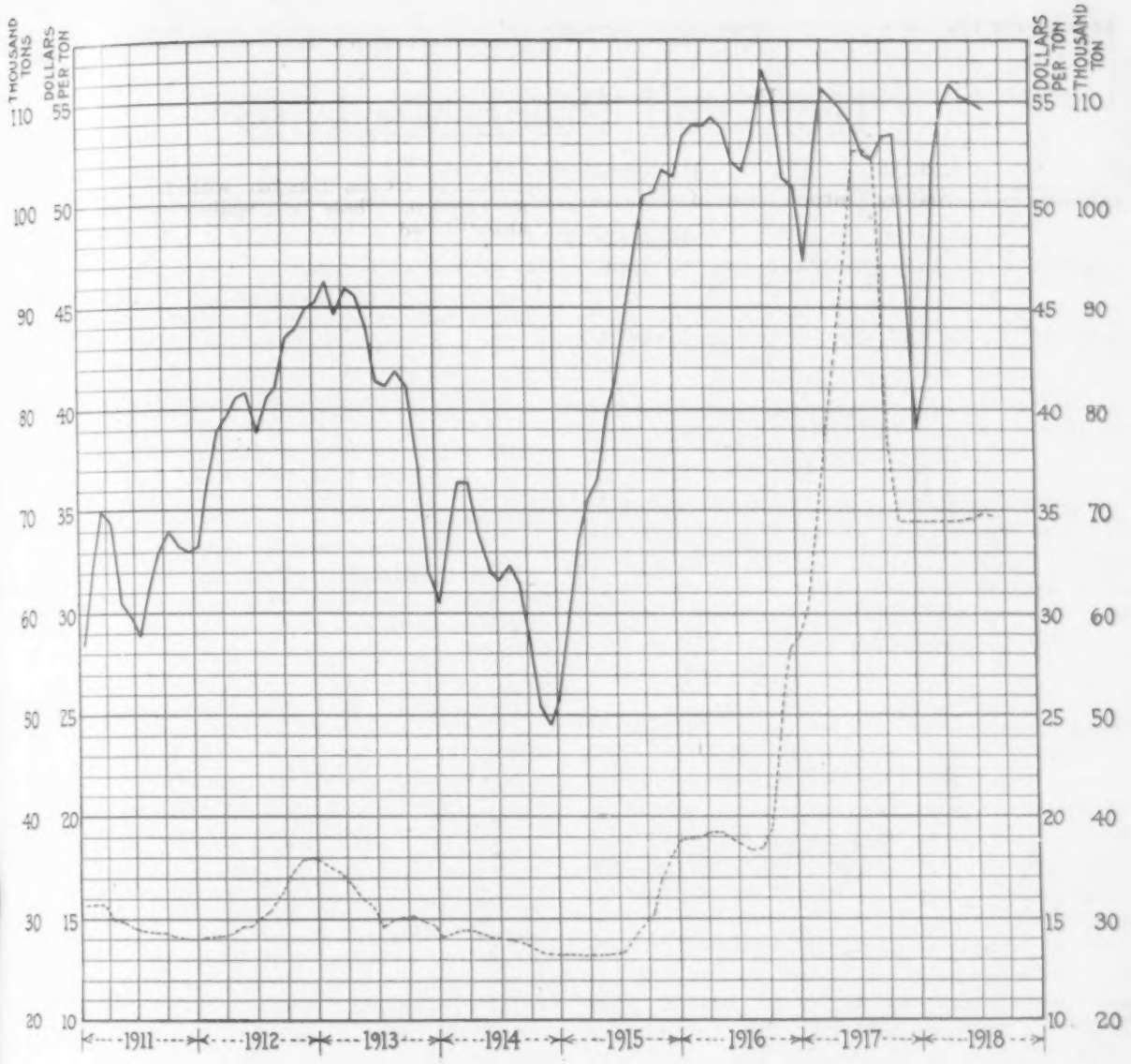
Location of furnaces	Total number of stacks	Sept. 1 Number in blast	Sept. 1 Capacity per day	Aug. 1 Number in blast	Aug. 1 Capacity per day
New York:					
Buffalo	21	21	7,022	21	7,022
Ferro	1	1	80	1	86
Other N. Y.	4	4	798	3	567
New Jersey	4	4	793	4	814
Ferro	1	0	0	1	23
Pennsylvania:					
Lehigh Valley	19	15	3,455	14	3,217
Spiegel	2	2	196	2	206
Schuylkill Val.	13	12	2,946	11	3,024
Ferro and Spiegel	2	0	0	1	80
Lower Susquehanna	8	8	1,785	7	1,792
Ferro	2	1	50	1	38
Lebanon Valley	7	6	847	5	770
Ferro and Spiegel	3	3	196	2	119
Pittsburgh Dist.	52	50	22,051	50	21,624
Ferro and Spiegel	5	5	624	5	673
Shenango Val.	19	19	6,016	19	6,050
Western Pa	25	20	5,885	21	6,017
Spiegel	3	2	125	2	210
Maryland	4	4	1,125	4	1,268
Wheeling Dist.	14	14	4,521	14	4,475
Ohio:					
Mahoning Val.	26	24	9,444	23	9,500
Central and Northern	26	26	10,027	24	9,926
Southern	17	15	2,246	15	2,186
Illinois and Ind.	40	37	17,750	38	18,146
Ferro	1	1	94	1	87
Mich., Wis. and Minn.	13	10	2 755	9	2,410
Col., Mo. & Wash.	7	4	1,121	5	1,027
Ferro	1	1	100	1	100
The South:					
Virginia	15	11	1,285	10	1,255
Ferro and Spiegel	4	4	168	3	125
Kentucky	7	5	641	5	650
Alabama	45	32	7,256	30	6,785
Ferro	1	1	38	1	33
Tenn. and Ga.	16	10	950	10	975
Total	427	372	112,390	363	111,360

The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1914—Gross Tons

	1914	1915	1916	1917	1918
Jan.	1,885,054	1,601,421	3,185,121	3,150,938	2,411,768
Feb.	1,888,670	1,674,771	3,087,212	2,645,247	2,319 299
Mar.	2,347,867	2,063,834	3,337,691	3,251,352	3,213,091
Apr.	2,269,655	2,116,494	3,227,768	3,334,960	3,288 211
May	2,092,686	2,263,470	3,361 073	3,417,340	3,446,412
June	1,917,783	2,380,827	3,211,588	3,270,055	3,323,791
July	1,957,645	2,563,420	3 224 513	3,342,438	3,420,988
Aug.	1,995,261	2,779,647	3,203,713	3,247,947	3,389,585
8 mos.	16,354,621	17,443,884	25,838,679	25,660,277	24,813,145
Sept.	1,882,577	2,852,561	3,202,366	3,133,954	.....
Oct.	1,778 186	3 125,491	3,508,849	3,303,038	.....
Nov.	1,518,316	3,037,308	3,311,811	3,205,794	.....
Dec.	1,515,752	3,203,322	3,178,651	2,882,918	.....
Total, yr*	23,049,752	29,662,566	39,039,356	38,185,981	.....

*These totals do not include charcoal pig iron. The 1917 production of this iron was 376,525 tons.



The Full Line Represents the Daily Production of Pig Iron and the Dotted Line Is the Average of the Cost Per Ton of No. 2 Southern Pig Iron at Cincinnati, local No. 2 Iron at Chicago and No. 2X Iron at Philadelphia

The figures for daily average production, beginning with January, 1911, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1911—Gross Tons

	1911	1912	1913	1914	1915	1916	1917	1918
Jan.	56,752	66,384	90,172	60,808	51,659	102,746	101 643	77 799
Feb.	64,090	72,442	92,369	67,453	59,813	106,456	94,473	82.835
Mar.	70,036	77,591	89,147	75,738	66,575	107.667	104,882	103,648
Apr.	88,836	79,181	91,759	75,665	70,550	107,592	111,165	109.607
May	61,079	81,051	91,039	67,506	73,015	108,422	110 238	111.175
June	59,585	81,358	87,619	63,916	79,361	107,053	109,002	110.793
July	57,841	77,738	82,601	63,150	82,691	104,017	107,820	110,354
Aug.	62,150	81,046	82 057	64,363	89,666	103,346	104,772	109,341
Sept.	65 903	82,128	83,531	62,753	95,085	106,745	104,465	.....
Oct.	67 811	86,722	82,133	57,361	100,822	113,189	106 550	.....
Nov.	66,648	87,697	74,453	50,611	101,244	110,394	106,859	.....
Dec.	65,912	89,766	63,987	48,896	103,333	102,537	92 997	.....

Diagram of Pig-Iron Production and Prices

The fluctuations in pig-iron production from 1910 to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production by months of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2 foundry pig iron at Cincinnati, local No. 2 foundry iron at furnace at Chicago and No. 2X at Philadelphia. They are based on the weekly market quotation of THE IRON AGE.

A new scale of wages for forge hands has been signed by a number of Toronto, Ont., firms. A minimum of $1 an hour is fixed for men on heavy forges. The schedule signed calls for a 9-hr. day, time and a half until 10 o'clock at night, then double time, also double time for Sundays and holidays.

Inquiry as to Pig Iron Output

The steel and pig iron distribution committees, which are assisting the War Industries Board in procuring steel and iron products, have been called upon for a statement relative to the probable increase of cf pig iron production. H. G. Dalton, chairman of the Pig Iron, Iron Ore and Lake Transportation Sub-Committee of the American Iron and Steel Institute, is collecting information as to proposed increases of blast furnace capacity, including details as to name, location, size of stacks building or contemplated. Companies are requested to advise him of any activities, actual or contemplated, of which they have knowledge.

The Hoskins Mfg. Co., Detroit, has let contracts to the Hazelton & Clark Co. for the construction of two additional factory buildings. One of these is an extension to the foundry and is of the brick and steel type, 60 x 185 ft. It will provide increased facilities for melting chrome alloys used in the manufacture of thermo-couples, and as resistance wire used in electric furnaces and other electrically heated devices. The other building will be used for the manufacture of electric heat-treating furnaces and pyrometers. This structure is of re-enforced concrete, two stories high, 60 x 195 ft.

The blast furnace of the McKeefrey Iron Co. at Leetonia, Ohio, after being relined and repaired, has been blown in on Bessemer iron.

Iron and Steel Markets

LABOR AND STEEL OUTPUT

Manufacturers Consider How to Meet the War Program

Pig Iron Production Still Declines While Number of Furnaces Increases

As was expected, August pig-iron production fell below that of July. It was at a less rate also than the outputs of April, May and June, but was higher than that of any other month since May, 1917. The total was 3,389,585 gross tons, or 109,341 tons a day, against 3,420,988 tons in July, or 110,354 tons a day—a falling off in the daily rate of about 1000 tons.

September opened with nine more furnaces in blast than on Aug. 1, and now that the season when enormous quantities of heated moisture are pumped into the stacks is probably over output should increase. Furnaces in blast Sept. 1 were 372 with capacity estimated at 112,390 tons a day, against 363 furnaces on Aug. 1, with daily capacity of 111,300 tons.

The meeting of iron and steel manufacturers in New York on Aug. 28 was occupied solely with the labor question and the matter of possible price changes for the last quarter of the year was not touched. Leaders in the industry realize that even the present insufficient rate of production cannot be maintained unless special measures are taken in connection with the new draft. More important still is the maintenance of existing hours and the safeguarding of the industry for the period of the war against such restrictions of output as have commonly accompanied union control. Some of the recent Washington decisions of labor issues have evidently not taken into account the grave consequences to the war program which would result from a wide enforcement of such findings in the steel and metal-working trades.

The conference on iron and steel prices between the general steel committee and the War Industries Board is appointed for Sept. 18 at Washington. An all-day meeting of the committee in New York, Sept. 3, will be followed by others at which the requests of various groups of manufacturers for higher prices will be considered.

Virginia, Tennessee and eastern Pennsylvania furnaces are heavily burdened by rising costs and are thought to have made a good case for an advance in the price of pig iron made in those districts. Thus the regional price plan adopted for coal will be pressed for consideration.

There will also be an organized presentation of the case of the smaller steel producers who buy pig iron in the market. Some of them are put under hardship by prices for plates and some other rolled products which yield handsome profits to the great integrated companies. The large earnings of the latter have created a strong sentiment at Washington against any advance in steel products. Whether differential prices, taking account of the wide variations in costs of integrated and non-integrated companies will come out of the next price conference is being more seriously considered than at any time.

Owing to the number of mills claiming that various forms of rolled steel are being sold at a loss under present prices, further labor exactions, according to these producers, will force advances at the next price fixing meeting. Even plates at 3.25c. Pittsburgh are below the cost of one mill which makes steel from its own pig iron.

The Lake Superior ore movement in August fell 934,000 tons below that of July, owing to the diversion of vessels from ore to grain. Yet with 9,725,000 tons moved last month, against 10,659,000 tons in July, the total for the season up to Sept. 1 was the greatest on record—39,334,000 tons against 39,215,000 tons to Sept. 1 in the previous high year, 1916. The fact that some pig iron producers have not bought ore enough to carry them to next May, when 1919 ore comes down, indicates the beginning of calculations based on a marked change in the war situation.

The pig iron committee of the American Iron and Steel Institute has sent out a questionnaire designed to bring out the facts as to new blast furnace capacity under construction or planned and all contemplated improvements that will add to the output of existing furnaces. Meanwhile a better coke supply must be had if normal output is to be expected from furnaces now running.

No further effort will now be made to establish steel rail prices before the conference of Sept. 18, which will deal with all prices for the fourth quarter.

Representatives of the malleable castings industry at a meeting in New York Aug. 30 adopted prices, making a number of revisions in the existing schedule, and these will be recommended to the War Industries Board.

The threatened inventory of the country's stocks of finished steel has been ordered by the War Industries Board. Manufacturing consumers of rolled iron and steel must report what they have down to the smallest holdings. Commandeering of surplus stocks for war purposes is a probable next step.

Pittsburgh

PITTSBURGH, Sept. 3—(*By Wire*).

It was expected that the question of prices on iron and steel for the last quarter would be discussed at the meeting of steel manufacturers in New York last week, but this was not done. The meeting was entirely taken up with the labor question and its relation to the output of iron and steel. A meeting will be held two weeks hence at Washington between the steel producers' committee and the War Industries Board, at which the matter of prices for the last three months will be taken up and settled. It is said the prospects for an advance of probably $2 in prices of pig iron are fair, but at the same time it is a fact that those close to the Administration are known not to favor any higher prices. One argument that will be used when

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

	Sept. 3 1918	Aug. 27 1918	Aug. 6 1918	Sept. 5 1917
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia	$34.40	$34.40	$34.40	$53.00
No. 2, Valley furnace	33.00	33.00	33.00	52.00
No. 2, Southern, Cincin.	36.60	36.60	36.60	49.90
No. 2, Birmingham, Ala.	33.00	33.00	33.00	47.00
No. 2, furnace, Chicago*	33.00	33.00	33.00	55.00
Basic, deliv., eastern Pa.	32.90	32.90	32.90	50.00
Basic, Valley furnace	32.00	32.00	32.00	48.00
Bessemer, Pittsburgh	36.60	36.60	36.60	51.95
Malleable Bess., Ch'go*	33.50	33.50	33.50	55.00
Malleable, Valley	33.50	33.50	33.50	52.00
Gray forge, Pittsburgh	33.40	33.40	33.40	46.95
L. S. charcoal, Chicago	37.85	37.85	37.85	58.00
Rails, Billets, Etc., Per Gross Ton:				
Bess. rails, heavy, at mill	55.00	55.00	55.00	38.00
O.-h. rails, heavy, at mill	57.00	57.00	57.00	40.00
Bess. billets, Pittsburgh	47.50	47.50	47.50	75.00
O.-h. billets, Pittsburgh	47.50	47.50	47.50	75.00
O.-h. sheet bars, P'gh	51.00	51.00	51.00	80.00
Forging billets, base, P'gh	60.00	60.00	60.00	100.00
O.-h. billets, Phila.	51.30	51.30	51.30	90.00
Wire rods, Pittsburgh	57.00	57.00	57.00	90.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	3.73	3.73	3.73	5.185
Iron bars, Pittsburgh	3.50	3.50	3.50	4.75
Iron bars, Chicago	3.50	3.50	3.50	4.50
Steel bars, Pittsburgh	2.90	2.90	2.90	4.00
Steel bars, New York	3.145	3.145	3.145	4.195
Tank plates, Pittsburgh	3.25	3.25	3.25	8.00
Tank plates, New York	3.495	3.495	3.495	8.945
Beams, etc., Pittsburgh	3.00	3.00	3.00	4.00
Beams, etc., New York	3.245	3.245	3.245	4.495
Skelp, grooved steel, P'gh	2.90	2.90	2.90	4.00
Skelp, sheared steel, P'gh	3.25	3.25	3.25	6.00
Steel hoops, Pittsburgh	3.50	3.50	3.50	5.75

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Sept. 3 1918	Aug. 27 1918	Aug. 6 1918	Sept. 5 1917
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	5.00	5.00	5.00	8.50
Sheets, galv., No. 28, P'gh	6.25	6.25	6.25	10.00
Wire nails, Pittsburgh	3.50	3.50	3.50	4.00
Cut nails, Pittsburgh	4.00	4.00	4.00	4.65
Fence wire, base, P'gh	3.25	3.25	3.25	3.95
Barb wire, galv., P'gh	4.35	4.35	4.35	4.85
Old Material, Per Gross Ton:				
Carwheels, Chicago	29.00	29.00	29.00	31.50
Carwheels, Philadelphia	29.00	29.00	29.00	34.00
Heavy steel scrap, P'gh	29.00	29.00	29.00	34.00
Heavy steel scrap, Phila.	29.00	29.00	29.00	31.00
Heavy steel scrap, Ch'go.	29.00	29.00	29.00	31.00
No. 1 cast, Pittsburgh	29.00	29.00	29.00	30.00
No. 1 cast, Philadelphia	29.00	29.00	29.00	32.00
No. 1 cast, Ch'gh (net ton)	30.00	30.00	28.25	24.00
No. 1 RR. wrot., Phila.	34.00	34.00	34.00	45.00
No. 1 RR. wrot., Ch'go, net	29.75	29.75	29.75	36.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$6.00	$6.00	$6.00	$13.50
Furnace coke, future	6.00	6.00	6.00	10.00
Foundry coke, prompt	7.00	7.00	7.00	14.50
Foundry coke, future	7.00	7.00	7.00	12.50
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	26.00	26.00	26.00	25.25
Electrolytic copper, N. Y.	26.00	26.00	26.00	25.25
Spelter, St. Louis	*9.12½*	9.25	8.10	8.00
Spelter, New York	*9.37½*	9.50	8.40	8.25
Lead, St. Louis	7.75	7.75	7.75	10.12½
Lead, New York	8.05	8.05	8.05	10.25
Tin, New York	*83.00*	88.00	94.00	61.00
Antimony (Asiatic), N. Y.	*11½ 12½*	14.25	13.00	14.50
Tin plate, 100-lb. box, P'gh	$7.75	$7.75	$7.75	$12.00

the meeting is held to discuss last quarter prices will be the enormous earnings of the Steel Corporation in the second quarter, and the present large earnings of other concerns such as Lackawanna, Republic, Youngstown Sheet & Tube, Inland and Jones & Laughlin Steel Co. Present earnings of these steel companies are said to be much the largest in their history, and the Administration is going to point this out very strongly as its reason for not making any higher prices for last quarter. Of course the large steel companies would not be benefited by an increase in the prices of pig iron, as instead of being sellers they are buyers in the open market. Should the price of pig iron be advanced, it is likely makers of billets and sheet bars would also insist on a corresponding higher price for their product and in turn the producers of finished steel would ask higher prices on their products. In other words, to disturb the price of pig iron would change the whole fabric. However, the pig-iron makers have some strong arguments which they will produce when the time comes, and which they fully believe will convince the War Industries Board that their request for an advance in prices of pig iron is fully justified and ought to be granted.

Local conditions in iron and steel are extremely quiet, and nothing of moment is happening. The local steel mills and blast furnaces are on a strictly 100 per cent war basis, and are bending every energy they can to turning out maximum output. It is believed August production of pig iron in the Pittsburgh district was larger than in July, in spite of the tonnage lost during the torrid wave in the early part of last month.

Pig Iron.—Producers of pig iron went to the meeting in New York on Aug. 28 with their costs of making iron in their pockets, expecting to have a chance to submit their cases and make a plea for higher prices on pig iron in last quarter, but as labor was the only subject discussed, they did not have a chance to produce their figures. It is said there is a very strong feeling, not only among merchant blast furnace owners, but among steel works blast furnaces as well, that the War Industries Board will allow an advance in prices of pig iron for last quarter when it has heard the arguments of the producers and has studied the higher costs of making iron. Three or four of the larger independent makers of pig iron have bought only a part of their ore for the year ending with next April, and say they will not take a chance of buying all of it with the present great uncertainty as to prices of pig iron when the war ends. One leading furnace operator predicts that prices of pig iron will go off fully $10 per ton as quick as the war ends, and says he is not going to be caught with a big stock of ore at present high prices on hand when this happens. In the meantime the entire output of pig iron is being allocated to consumers making war essentials and none is being sold by the furnaces in the open market. There has been no selling of pig iron for first half of next year for some time, the Government discouraging this, and furnaces are not anxious to sell so far ahead. We have no sales of iron to note, but the new inquiry is very heavy with no pig iron being offered in this district.

Basic pig iron, $32; Bessemer, $35.20; gray forge, $32; No. 2 foundry, $33; No. 3 foundry, $32.50, and malleable $33.50, all per gross ton at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh district being $1.40 per ton.

Billets and Sheet Bars.—Only an occasional small lot of discard steel is offered in the open market, and this is very quickly snapped up. Several large dealers here, who formerly handled many thousands of tons of billets and sheet bars every year in the way of purchases and trades, say they have not handled a ton of steel for some months. The entire output of billets and sheet bars is tightly held between the mills and consumers. The increasing demands of the Government for shell steel is intensifying the shortage in supply of sheet bars, and several of the larger mills rolling sheets have been closed for a week or two at a time recently waiting for sheet bars to ar-

rive. Discard steel is bringing practically the same price as soft 4 x 4-in. billets, which is $47.50 at mill.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at $47.50, and bars $51, forging ingots $73, and forging billets $60 base all f.o.b. at mill, Pittsburgh or Youngstown.

Ferroalloys. — The inquiry for ferromanganese and other ferroalloys is quiet, and most consumers who care to have covered their needs of ferromanganese for first half of next year, while other consumers say they are not anxious to cover for that period until later. A sale of 200 tons of 50 per cent ferrosilicon, 50 tons per month, August to December, is reported at $150 per gross ton, delivered. We also note sales of 600 tons of 70 per cent domestic ferromanganese for first half of next year at $250 per gross, delivered.

We quote 70 per cent ferromanganese at $250 delivered, 16 per cent spiegeleisen at $75 at furnace and 50 per cent ferrosilicon for prompt shipment at $160 and for delivery over the last half of the year, $150 to $155 at furnace, the furnaces usually absorbing the freight.

We quote 9 per cent Bessemer ferrosilicon at $54; 10 per cent, $55; 11 per cent, $58.30; 12 per cent, $61.60. We quote 6 per cent silvery iron, $41; 7 per cent, $43; 8 per cent, $45.50; 9 per cent, $47.50; 10 per cent, $50. Three dollars per gross ton advance for each 1 per cent silicon for 11 per cent and over. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, these furnaces having a uniform freight rate of $2.90 per gross ton, for delivery in the Pittsburgh district.

Plates.—The output of plates continues very heavy, but still seems to be far short of Government requirements over last half of this year. In August the Carnegie Steel Co. rolled a total of 111,539 tons. This compares with a total of 116,417 tons made by this company in June, and was also slightly less than the output in July, the falling off being due entirely to the hot weather in the early part of August. Practically 100 per cent of the output of plates in the Pittsburgh and nearby districts is going to the Government on war essentials. The Pressed Steel Car Co., which will build 2300 high side and 500 low side steel gondolas, will need about 28,000 tons of plates and shapes for these cars, while the Standard Steel Car Co., which will build 4500 high side and 1000 low side steel gondolas, will need about 55,000 tons. All this steel will be furnished by local mills. The Standard Car Construction Co., Sharon, Pa., has taken 300 flat cars and 400 tank cars from the Government for France, and will need about 8000 tons of plates and small shapes. The Baltimore & Ohio Railroad is inquiring for 500 flat cars, 500 wooden box cars and 100 cabooses. Local plate mills are sold up for months ahead, and it is said the obligations to the Government on plates by the Carnegie Steel Co. are now so heavy that they will take practically all the output of this company for the remainder of this year and all of next year. We quote sheared plates at 3.25c., at the mill, Pittsburgh, for third quarter.

Structural Material.—Practically everything being placed is Government work. Of the 12,000 tons for the new plants of the Air Nitrates Corporation at Toledo, and also near Cincinnati, 4000 tons have been placed with independent fabricators, while 8000 tons are still pending. The Fort Pitt Bridge Works has taken 400 tons for railroad shops for the Chesapeake & Ohio Railroad at Huntington, W. Va. The American Bridge Co. and McClintic-Marshall Co. are operating on practically 100 per cent Government work, and have work ahead for many months. We quote beams and channels up to 15 in., at 3c. at mill, Pittsburgh, for third quarter.

Iron and Steel Bars.—Local concerns rolling soft-steel bars say they have not been asked as yet to take any contracts from implement makers for soft-steel bars for delivery over the remainder of this year, on which they are to make the concessions of $5 per ton. There seems to be no doubt whatever that the implement makers will be allowed this $5 concession on shipments of steel bars over remainder of this year, but the official notices to this effect from the heads of the steel companies who agreed to make the concession have not yet been received by their local sales managers. It is said the formal notices are being held up until the objections from other consumers who will not be granted the concession have quieted down. Output of steel bars will be very much reduced from this time forward owing to the increased demand of the Government for shell steel which has to be rolled on some of the steel bar mills. The demand for iron bars is quiet, and there is some space open for orders for fairly prompt shipment. We quote soft-steel bars rolled from billets at 2.90c.; from old steel rails, 3c.; and refined iron bars at 3.50c. at mill, Pittsburgh, for third quarter.

Sheets.—While no official figures are yet available, it is almost certain that the output of sheets in August by all the mills was less than in July, this being due to the shortage in supply of sheet bars, and also to the hot weather in the early part of August, when output fell off severely. Recently three large makers of sheets had their mills down for a week or two at a time, waiting for sheet bars to arrive, and the outlook is that this will be the case right along. The demands made on the mills for shell steel are getting so heavy that they must necessarily cut down their output of sheet bars. It is not believed operations for sheet mills for September will be on more than 50 per cent basis. Mills have practically no sheets to offer on new orders for this year delivery. Prices on sheets for this quarter are given on page 603.

Tin Plate.—It is believed the output of tin plate in August will be as large as in July, but the official figures will not be ready for a few days. Some output was lost in the early part of August because of the very hot weather, but it is believed this was more than made up in the last half of the year, when working conditions were ideal. Output of tin plate is still running close to 95 per cent of normal, and mills are sold up for months, and will no doubt carry into the early part of next year a good deal of tonnage that should have been shipped out this year. The output of terne plate is light, and its manufacture is being discouraged by the Government as much as possible. It is not believed any change will be made in the price of tin plate for last quarter. We quote tin plate, made from Bessemer or open-hearth steel, and it is nearly all being made from Bessemer steel, at $7.75 per base box, f.o.b. Pittsburgh for third quarter. Prices on terne plate are given on page 603.

Wire Products.—Allocations have been made on the 21,000 tons of plain wire for shipment to France, and are about completed on the 56,000 tons of 4-point black painted barb wire, of which 22,000 tons are for France and 34,000 tons for the United States War Department. The output of wire products is steadily being cut down, and will be still further reduced because of the heavy demands of the Government for shell steel. It is expected the Donora steel plant of the American Steel & Wire Company will be working on shell steel within a short time, and this means that no nails or wire will be made in the Donora wire mill. Practically no nails or wire are being shipped to the jobbing trade, as nearly 100 per cent of the entire output of the mills is going to the Government on direct orders. A number of large consumers of wire and wire nails have been notified by the mills that their supply will be entirely cut off while present conditions last. Local jobbers report it is impossible to get any deliveries of wire nails, and none of the mills has any plain wire to sell for this year at least. Prices on wire and wire nails for third quarter are given on page 603.

Wire Rods.—None of the local makers is quoting on new inquiries for wire rods, which are heavy, stating they have no rods to offer, as they need their entire output for their own wire mills. The demand for high-carbon rods is also active, and one leading mill that makes a specialty of rolling these rods reports it is sold up for some months. Prices on rods for this quarter are given on page 603.

Cotton Ties.—Very few new sales are being made, consumers having covered nearly their entire needs for the season some months ago. One maker still has some cotton ties to sell for last quarter, and will dispose of these just as soon as the price for that delivery is fixed. We quote cotton ties for September shipment at $1.95 per bundle of 45 lb. f.o.b. Pittsburgh.

Shafting.—Output of shafting is being steadily reduced owing to the heavy demands for shell steel, while

the commercial demand is also falling off, and it is said no orders are being accepted from automobile makers. The present output of shafting is not more than 50 per cent of normal, and it will be less in a short time. On the smaller sizes makers report the demand dull, but for sizes 2¼ in. and larger they are sold up for three or four months. For third quarter we quote cold-rolled shafting at 17 per cent off list in carloads and 12 per cent in less than carloads, f. o. b. Pittsburgh.

Nuts and Bolts.—The makers will present strong arguments to the War Industries Board this month for an increase on nuts and bolts, which they claim are on entirely too low bases in view of increased labor costs and other higher manufacturing operations. The Government is taking nearly 100 per cent of the present reduced output, which is only about 75 per cent or less of normal. Discounts for third quarter are given on page 603.

Rivets.—Makers report the commercial demand very dull, but from shipyards and other consumers working on war essentials is very heavy. A Government inquiry for 10,000 to 12,000 tons of ship rivets is looked for this week. Makers state nearly their entire output is going to the Government on direct or indirect orders. We quote butthead structural rivets at $4.40, conehead boiler rivets at $4.50 per 100 lb. Small rivets are 50 and 10 per cent off list for third quarter f.o.b. Pittsburgh.

Hoops and Bands.—Output is down 50 per cent or less owing to shortage of steel. The demand for hoops for cooperage purposes is very heavy and mills say they are sold up for some time. We quote steel hoops and bands at 3.50c. per lb. base, f.o.b. Pittsburgh, for third quarter.

Spikes.—The demand from the railroads for standard spikes is very quiet, but for small spikes from the coal interests and also for boat spikes is very active. It is said present output of spikes is not more than 50 per cent of normal and may soon be less, owing to shortage in steel. We quote:

Standard sizes of railroad spikes 9/16 x 4½ in. and larger, $2.90 per 100 lb. in lots of 200 kegs of 200 lb. each, or in larger lots. Boat spikes, $5.25 per 100 lb., rack bolts, $4.90 base in lots of 200 kegs or more; less than 200 keg lots, $1 per 100 lb. extra. All f.o.b. Pittsburgh.

Hot-rolled Strip Steel.—The new demand for this material from consumers in classes A and B is very heavy, the material going into war essentials. Output is 60 per cent or less of normal owing to shortage in steel. We quote hot-rolled strip steel at $3.50 per 100 lb., Pittsburgh, for third quarter, 50c. additional being charged per 100 lb. for special stamping quality.

Cold-rolled Strip Steel.—The demand from the jobbers is fairly active, but the Government has not placed any large orders for some time. Mills say output is only about 50 per cent of normal. We quote:

We quote cold-rolled strip steel at $6.50 per 100 lb. f.o.b. Pittsburgh, terms 30 days, less 2 per cent for cash in 10 days when sold in quantities of 300 lb. or more. Freight is allowed to destination when it does not exceed 31c. per 100 lb.

Skelp.—Mills rolling iron and steel skelp are sold up for remainder of this year and output is being reduced on account of the increased Government demand for shell steel.

We quote grooved skelp at $2.90; universal skelp, $3.15, and sheared skelp, $3.25 base. Special skelp for boiler tubes, etc., is $3.40 for base sizes and $3.55 for other sizes, all prices being per 100 lb., f.o.b. Pittsburgh.

Wrought Pipe.—Mills rolling iron and steel pipe are being called on to furnish larger quantities of shell steel and also to increase their output of plates, so that the production of iron and steel pipe will likely show a large falling off over the next several months. Mills have large Government orders for iron and steel pipe, and their shipments to jobbers to replenish their stocks are light, but at the same time the mills state they are giving the jobbers all the pipe they possibly can. None of the pipe mills has any tonnage to spare on new orders for the remainder of this year. Discounts on iron and steel pipe for this quarter are given on page 603.

Boiler Tubes.—None of the mills rolling iron and steel tubes has any to offer for this year's delivery, and some are sold up for the first three or four months of next year. Two large makers of seamless steel tubing state their entire output is sold up not only for the remainder of this year but for practically all of 1919. Discounts on iron and steel tubes for this quarter are given on page 603.

Coke.—The supply of cars in the coke regions last week was fine and shipments to the furnaces were heavier than in any one week for some time. It is now planned to ship more coal to the by-product coke ovens in order to bring up the output, which has been falling off for some time. It is said the greatest loss in output of by-product coke has been in the Chicago district. Blast furnaces report they are receiving an ample supply of beehive coke to meet their needs, but are not able to accumulate any stocks. No contracts are being made and any free coke that is offered on the market is very quickly taken up. Output of coke in the upper and lower Connellsville regions for the week ending Aug. 24 was 337,705 tons, an increase of 11,095 tons over the previous week. We quote 48-hr. blast-furnace coke at $6; 72-hr. foundry, $7, and crushed coke over ¾ in. at $7.30, all in net tons of 2000 lb. at oven.

Old Material.—Local dealers report they are disposing of fairly large quantities of melting scrap to the steel mills and could do a heavy business if they were able to secure the scrap. Recently a large steel mill in this city bought 2500 tons of machine-shop turnings and 2500 tons of cast-iron borings in the Chicago district for delivery to its local mills, paying the Government price of $19 at Chicago, also the commission of 3½ per cent to the dealer and the freight differential of $4.05 per ton, the scrap costing nearly $24 delivered. Most of the demand is for heavy melting steel scrap, low phosphorus and borings and turnings. We quote:

Heavy steel melting scrap, Steubenville, Follansbee, Breckenridge, Monessen, Midland and Pittsburgh, delivered	$29.00
No. 1 cast scrap (for steel plants)	29.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., Franklin, Pa., and Pittsburgh	34.00
Hydraulic compressed steel scrap	29.00
Bundled sheet scrap, sides and ends, f.o.b. consumer's mills, Pittsburgh, district	$27.50 to 29.00
Bundled sheet stamping scrap	22.00 to 23.00
No. 1 busheling scrap	28.00 to 29.00
Railroad grate bars	18.00 to 19.00
Low phosphorus melting stock (unguaranteed)	34.00
Low phosphorus melting stock (guaranteed)	36.50
Low phosphorus melting stock (bloom and billet ends heavy plates)	39.00
Iron car axles	46.00 to 46.50
Locomotive axles, steel	46.00 to 46.50
Steel car axles	46.00 to 46.50
Railroad malleable (for malleable works)	34.00
Machine shop turnings	19.00
Cast iron wheels	29.00
Rolled steel wheels	36.00
Sheet bar crop ends (at origin)	35.00
Cast iron borings	19.00
No. 1 railroad wrought scrap	34.00
Heavy steel axle turnings	24.00
Heavy breakable cast scrap	28.00 to 29.00

The annual meeting of stockholders and directors of the Page Steel & Wire Co., Pittsburgh, was held in Jersey City, N. J., Aug. 28. Directors were elected as follows: B. Lissberger, Arthur A. Clement, Joseph N. Podrasnik, John E. Carr, Arthur B. Cody, Elmer C. Sattley, Charles M. Lamb, Homer O. Page, George L. Bennett, Allan M. Clement, Alois Podrasnik, Leslie B. Robertson and Norman Bridge. Officers elected are B. Lissberger, president; Arthur A. Clement and Joseph N. Podrasnik, vice-presidents; Arthur B. Cody, secretary; John E. Carr, assistant secretary and treasurer; Joseph N. Podrasnik, assistant treasurer; E. C. Sattley, general manager. Dividends of $3 per share were declared on the first preferred stock, $3.50 per share on the second preferred stock for the period from Jan. 1 to July 1, 1918, and payable Oct. 31. Certified balance sheets as of June 30, 1918, the end of its fiscal year, showed net profits for the year of $420,555.80. The company states it has unfilled orders to the amount of $4,000,000 on its books.

Chicago

CHICAGO, Sept. 3.

While no tonnages are mentioned, the Government is known to be seeking more 82-mm. shell steel used in the making of 75-mm. shells of which enormous quantities are being consumed at present in the tactics of the Allied forces in France. The guns using these shells are adaptable for quick movements such as have been necessary in following the enemy in his retreat.

The general situation shows no change worthy of comment. Efforts are still being made to secure for the jobbers a rating better than B-4 in order to enable them to secure material. As matters stand, they find sheets the easiest material to procure. Several of the industries which use sheets have not so far obtained authorization as specific as the mills desire for shipments, among these industries being the manufacturers of elbows and stovepipe.

Steel bars are growing tighter, just why is not explained. Practically all of the trade now concede that the agricultural implement makers are to receive a $5 per ton reduction on their steel, although official announcement has not yet been made.

As was predicted some time ago, the producers of pig-iron will henceforth make monthly reports showing the status of production and stocks, these reports superseding the weekly reports heretofore made. The reports will not only show how much iron consumers have in stock and in transit, but indicate the brands and the uses for which it is intended. Buying for the first-half by strictly war consumers shows a tapering off. The old material market is so quiet as to cause comment among the dealers. But little heavy melting steel is coming out.

Pig Iron.—Buying for delivery in the first half of 1918 is tapering off, otherwise there is no change in the market which for many weeks has been pursuing a routine course in placing iron in accord with the desires of the War Industries Board. Jackson, Ohio, furnaces are among those which have been selling for the first half, placing a little silvery and Bessemer ferrosilicon with regular customers doing war work. The furnaces are to revise their methods of preparing reports for the War Industries Board and in the future will submit them monthly, instead of each week. They will have until the tenth of each month in which to get the required statistics on file at Washington. The furnaces, or their agents, in turn must obtain from their customers a report as to the amount of iron they have in stock and in transit, as well as the uses they have for it, and whether these are for direct or indirect war work. Through this means the War Industries Board will not only be informed as to the status of each consumer with regard to his supply of iron, but it also will know just what brands he has and how urgent it is for him to have the iron. After the new system is started, it will relieve the clerical forces of sellers, furnaces and consumers, inasmuch as the weekly reports are superseded.

The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable, steel-making irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$38.00
Lake Superior charcoal, No. 6 and Scotch	$39.50 to 41.00
Northern coke foundry, No. 1	33.50
Northern coke foundry, No. 2	33.00
Northern coke foundry, No. 3	32.50
Northern high-phosphorus foundry	33.00
Southern coke No. 1 foundry and No. 1 soft	39.50
Southern coke, No. 2 foundry	38.00
Malleable	33.50
Basic	32.00
Low phosphorus (copper free)	53.00
Silvery, 7 per cent	46.20

Ferroalloys.—Both 70 per cent ferromanganese and Bessemer ferrosilicon have been sold for first half delivery, but the market presents no unusual feature.

We quote 70 per cent ferromanganese at $250, delivered; 50 per cent ferrosilicon at $150 to $160, delivered, and 16 to 18 per cent spiegeleisen at $75, furnace.

Plates.—With the entire output being distributed under Government direction and a disposition to say but little or nothing about Government orders, not much can be reported.

The official mill quotation is 3.25c., Pittsburgh, the freight to Chicago being 27c. per 100 lb. Jobbers who have stock quote 4.52c.

Structural Material.—Reports are current that the Government is seeking capacity for structural shapes, but that does not appear to have affected this district. In small shapes, the Government has been able to secure considerable help from the smaller mills, including the bar mills which have been adapted to roll small sizes of shapes. In regard to structural work, it is apparent that the Government intends to be even more drastic than it has been in curtailment. The Denver & Rio Grande Railroad has awarded to the Virginia Bridge & Iron Co. 1050 tons for eight riveted truss bridges. It is now proposed to readvertise the Rush street bridge, Chicago, which will require around 8000 tons, and to let the contracts in sections, provided official sanction can be obtained.

The official mill quotation is 3c., Pittsburgh, which takes a freight rate of 27c. per 100 lb. for Chicago delivery. Jobbers quote 4.27c. for material out of warehouse.

Bars.—Producers report that steel bars are tightening. It is now quite generally accepted that the agricultural implement makers are to be given the $5 reduction of which so much has been said, although sales managers have not been officially informed. Some of the makers think the proposition unjust, but all they can do is to accept the situation philosophically. The Government is pressing for 82-mm. shell stock for 75-mm. shells. Rail carbon bars are difficult to procure because of the rail scarcity, although the demand is lighter because of the lessened building. Bar-iron activity continues to improve and is expected to grow even greater.

We quote, mill prices, mild steel bars at 2.90c., Pittsburgh, taking a freight rate to Chicago of 27c. per 100 lb. Bar iron is quoted at 3.50c., Chicago, and rail carbon at 3c., Chicago, a leading maker having adhered to Chicago as the basing point. Jobbers' prices follow:

Soft steel bars, 4.17c.; bar iron, 4.17c.; reinforcing bars, 4.17c., base. No extra charge for twisting ¾-in. and over; 2½c. for twisting ⅝, 11/16, ½ and 9/16; 5c. for 7/16 and ⅜; 10c. for 5/16 and 15c. per ¼-in. Extras as per card are charged for small sizes. Shafting, list plus 13 per cent.

Sheets.—About two-thirds of capacity continues to be the rate of production. Frequent rulings having to do with distribution are received, and the mills are disposed to go slowly until they receive positive authority from consumers. Makers of stove-pipe elbows and stovepipe have not yet received definite authority to obtain deliveries, although this would seem to be important in view of the approach of winter. They have a general authorization which the mills would like to see made specific. The jobbers are getting some material, but their chances are not very good with a B-4 classification. Steps are being taken at Washington toward having them rated higher. For mill prices see finished iron and steel, f.o.b. Pittsburgh.

Chicago delivery out of stock regardless of quantity. No. 10 blue annealed, 5.52c.; No. 28 black, 6.52c., and No. 28 galvanized, 7.77c.

Bolts and Nuts.—All that was said last week as to the care which makers are exercising in taking orders can be repeated. The need must be essential to obtain delivery. For mill prices, see finished iron and steel, f.o.b. Pittsburgh. Jobbers quote:

Structural rivets, 5.67c.; boiler rivets, 5.77c.; machine bolts up to ⅞ x 4 in., 37½ per cent off; larger sizes 25 and 5 off; carriage bolts up to ⅞ x 6 in., 32½ off; larger sizes, 20 off; box pressed nuts, square, tapped, $1.05 off; hexagon tapped, 85c. per 100 lb.; coach or lag screws, gimlet points, square heads, 40 per cent off.

Wire Products.—The manufacturers have noted the report that their output may be still further reduced to help out in other directions, but they regard it with no dismay. They say almost anything may be expected in times such as these. For prices see finished iron and steel, f.o.b. Pittsburgh, page 603.

Old Material.—Several dealers comment on the degree to which the market has been quiet the past week. But little scrap is offered, although all the heavy melting steel obtainable can be placed without difficulty. Of the various items, stove plate has been fairly active, and there have been some sales of No. 1 busheling,

despite the East Chicago mills being temporarily out of the market, evidently expecting a better moment for buying to come. The North Western will close a list this week.

We quote for delivery in buyers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Old iron rails	$39.00
Relaying rails	$55.00 to 60.00
Old carwheels	29.00
Old steel rails, rerolling	34.00
Old steel rails, less than 5 ft.	34.00
Heavy melting steel	29.00
Frogs, switches and guards, cut apart	29.00
Shoveling steel	29.00
Heavy steel axle turnings	24.00
Per Net Ton	
Iron angles and splice bars	$34.82
Iron arch bars and transoms	41.52
Steel angle bars	30.36
Iron car axles	41.52
Steel car axles	41.52
No. 1 railroad wrought	$29.75 to 30.36
No. 2 railroad wrough	28.25 to 28.75
Cut forge	28.25 to 28.75
Pipes and flues	24.50 to 25.00
No. 1 busheling	27.00 to 27.68
No. 2 busheling	18.50 to 19.00
Steel knuckles and couplers	30.36
Coil springs	30.36
No. 1 cast scrap	30.00 to 30.36
Boiler punchings	32.53
Locomotive tires, smooth	40.50 to 41.50
Machine-shop turnings	15.75 to 16.25
Cast borings	16.50 to 16.96
Stove plate and light cast scrap	25.50
Grate bars	25.50
Brake shoes	25.50
Railroad malleable	30.36
Agricultural malleable	29.00 to 30.00
Country mixed scrap	22.00 to 22.50

Rails and Track Supplies.—That the railroads must have more rails and track equipment is recognized, and the Government is striving to help them. We quote:

Standard railroad spikes, 4.11½c., Chicago. Track bolts, with square nuts, 5.11½c., Chicago. Tie plates, steel, 3.25c.; tie plates, iron, 3.75c.; f.o.b. maker's mill. The base for light rails 18 3c., f.o.b. maker's mill, for 25 to 45-lb. sections, lighter sections taking Government extras.

Cast-Iron Pipe.—Madill, Okla., will take bids, Sept. 4, for 200 tons, but inquiries worthy of note are otherwise nil, and no municipal business can be reported as placed. A few carload lots have been figured on. Government business continues to come along and is the best prospect the shops have. The Rock Island Arsenal has taken about 800 tons.

We quote per net ton, f.o.b. Chicago, ex-war tax as follows: Water pipe, 4-in., $64.80; 6-in. and larger, $61.80. Class A and gas pipe, $1 extra.

Philadelphia

PHILADELPHIA, Sept. 3.

At a meeting in Washington on Wednesday, Sept. 18, between the Committee on Steel and Steel Products of the American Iron and Steel Institute and the Price Fixing Committee of the War Industries Board, there will be consideration of prices of iron and steel for fourth quarter. The Association of Steel Makers of Class III held a meeting in New York on Wednesday, Aug. 28, and it is understood that the members agreed upon asking for higher prices on the products they manufacture. Another meeting will be held soon, at which a definite proposal will be formulated and submitted to the Committee on Steel and Steel Products. Some of the operators of blast furnaces, particularly those in Tennessee, Virginia and eastern Pennsylvania, will ask for an advance on pig iron. It is likely that the War Industries Board will be requested to consider a plan whereby pig iron prices will be advanced by districts, following the precedent established on coal and coke.

Pig Iron.—Not much publicity is being given to the plans of furnace operators to ask the War Industries Board for higher prices, but it is known that the Virginia operators have held a meeting at which it was decided to ask for an advance, and it is said to be likely that Tennessee and eastern Pennsylvania ironmakers will follow suit. The regional plan is now advocated as the best method of solving the price question for pig iron. This is the method which the Fuel Administration has followed in granting higher prices to certain groups of mining companies or coke manufacturers whose costs were shown to be so high that they could not make a profit at the first-named Government prices. It is admitted that owners of larger blast furnaces are making a fair profit at present prices, but some of the small furnaces are said to be showing a loss. If a flat advance were granted to all operators it would result in fairly large profits for some, while smaller furnaces would derive only moderate benefit. The zoning system has been carefully considered, but the suggestion of making the Mahoning and Shenango Valleys the basing point does not meet with universal favor, and the suggested plan of establishing two or three basing points—as, for example, the Valleys, Birmingham and Chicago—is pointed to as one that would lead to much confusion. Pig-iron makers are fully aware that some members of the War Industries Board are still strongly in favor of pooling the entire output of the country, apportioning a profit to each operator. The market is inactive, few sales being made except off-grade iron. Booking of orders for the first half of next year is being done quietly. Under agreement with the War Industries Board, the makers of low phosphorus iron are now taking on business for next year. The Eastern Steel Co. is now operating its two furnaces at Pottsville, Pa., on basic iron, one of them until recently having been on low phosphorus. Consumers who bought foundry iron from these furnaces are obliged to look elsewhere if their needs are immediate. To the Phoenix Iron Co., Phoenixville, Pa., has been allocated 24,000 tons of basic iron. We quote standard grades of iron f. o. b. furnace, except Virginia iron, for which delivered prices are quoted:

Eastern Pennsylvania No. 1 X	$34.00
Eastern Pennsylvania No. 2 X	33.50
Eastern Pennsylvania No. 2 foundry	33.00
Virginia No. 2 X (including freight)	37.60
Virginia No. 2 foundry (including freight)	37.10
Basic	32.00
Gray forge	32.00
Bessemer	35.26
Standard low phosphorus	53.00
Low phosphorus (copper bearings)	50.00

Ferroalloys.—The market is quiet, and prices continue without change, namely, $250 per ton delivered, for 70 per cent ferromanganese, and $75 per ton, f. o. b. furnace, for 16 to 18 per cent spiegeleisen.

Coke.—We quote 48-hr. furnace coke at $6, and 72-hr. foundry coke at $7 f. o. b. Connellsville.

Billets.—Rerolling billets are being allocated occasionally to small rolling mills which haven't their own steel supply, but otherwise there is no activity. We quote 4 x 4-in. open-hearth rerolling billets at $51.30, Philadelphia.

Finished Iron and Steel.—There will soon be three new factors in the local plate market, but their output until the end of the war will be taken over directly by the Government. The Worth Steel Co. mill at Claymont, Del., and the Penn Seaboard Steel Corporation mill at New Castle, Del., will soon be rolling plates. Two new mills of the Brier Hill Steel Co., Youngstown, Ohio, which has sales offices here, will be put in operation some time this month. The new 84-in. jobbing mill will be in operation within a week or two, and the new 132-in. sheared plate mill will be ready by the end of the month. These two mills will give the Brier Hill Steel Co. a monthly plate output of 25,000 tons. Additional metal will be provided by a new blast furnace, which will blow in this month. The city of Philadelphia is inquiring for 4200 tons of 60, 70 and 90-lb. rails and several hundred tons of track material for delivery in 1919, this steel being needed for elevated railroad extensions. Upon being assured of the essential character of the work, rail mills may submit bids. The probability that makers of steel who come within the Class III grouping of the Federal Trade Commission will ask for an advance in prices for fourth quarter has interested the trade greatly. These mills have organized as the Association of Steel Makers of Class VI, J. V. W. Reynders, president American Tube & Stamping Co., Bridgeport, Conn., being chairman. The

association met in New York last Wednesday, and will hold another meeting soon to present a proposal for higher prices to the Committee on Steel and Steel Products of the American Iron and Steel Institute. We quote plates at 3.48c.; structural materials at 3.23c.; soft steel bars at 3.13c.; bar iron, 3.73c.; No. 10 blue annealed sheets, 4.48c.; No. 28 black sheets, 5.23c., and No. 28 galvanized, 6.48c., all Philadelphia.

Old Material.—Dealers are finding it more and more difficult to obtain material. A considerable volume of scrap which formerly came into this district from New England is now being consumed in that section or at points between here and New England. We quote for delivery at buyers' works in eastern Pennsylvania as follows:

No. 1 heavy melting steel	$29.00
Steel rails, rerolling	34.00
No. 1 low phosphorus heavy, 0.04 and under	39.00
Low phosphorus, 0.04 and under	36.50
Low phosphorus, 0.06 and under	$32.00 to 34.00
Old iron rails	39.00
Old carwheels	29.00
No. 1 railroad wrought	34.00
No. 1 yard wrought	33.00
Country yard wrought	29.00
No. 1 forge fire	$28.00 to 29.00
Bundled skeleton	28.00 to 29.00
No. 1 busheling	31.00
No. 2 busheling	19.00 to 20.00
Turnings (for blast furnace use)	18.50 to 19.00
Machine-shop turnings (for rolling mill use)	18.50 to 19.00
Cast borings (for blast furnace use)	18.50 to 19.00
Cast borings (clean)	19.00
No. 1 cast (for steel plant use)	29.00
No. 1 cast (cupola sizes)	34.00
Grate bars	28.00 to 29.00
Stove plate	28.00 to 29.00
Railroad malleable (for steel plants)	29.00
Railroad malleable (for malleable works)	34.00
Wrought iron and soft steel pipes and tubes (new specifications)	33.00
Ungraded pipe	29.00

Birmingham

BIRMINGHAM, ALA., Sept. 3.

Pig Iron.—Total allocations of basic iron in the Birmingham district shared by the Sloss-Sheffield and Woodward and Alabama companies on the basis of two-fifths and one-fifth respectively, to date, are officially as follows: For the English Government 80,000 tons; for domestic consumption in the East, 36,000 tons; total, 116,000 tons. Foundry allocations are such as to practically eliminate sales agents, the latest foundry allocation being for 9500 tons, covering almost the entire country. Southern foundries may now be considered as well on a war basis, so much so that there will be no decrease, but rather an increase, in this consumption. When there is added to this the growing number of furnaces placed on basic and the very small stock of iron on Alabama yards, 50,000 tons on Aug. 1, with the chances that that has been still further depleted, the status of the foundry trade so far as Alabama make is concerned is discernible. Famine may not be the word, but it is close to it, and getting closer. There has been some slight improvement in furnace operations owing to a cessation of the extremely warm weather and the improvement in the raw-material supply is also noticed. There is a growing conviction that the work or fight order is to be taken literally, and negroes especially are responding. The machine shop of the Bessemer plant of the United States Cast Iron Pipe & Foundry Co. has resumed, and is making castings for war purposes. The demand for iron is pressing from all sides. We quote per gross ton, f. o. b. Birmingham district furnaces, as follows:

No. 2 foundry and soft	$33.00
Basic	32.00

Cast Iron Pipe.—Pipe shops have gotten well on to war work and are turning out a large quantity of shells and castings. Only a sprinkling of municipal renewal contracts is received. Sanitary shops are interested in the prospect of orders incident to the Federal housing projects, especially in the Muscle Shoals district, and they are also doing much war work. The trouble is beginning to be the securing of sufficient pig iron.

Coal and Coke.—The Alabama coal miners have begun to reach the maximum pace of a few weeks ago, when they produced 433,000 tons, compared with a 1917 maximum of 379,000 tons. The last week's output was 430,000 tons, an increase over the previous week of 13,000. Better weather conditions are having an effect and the negroes are also responding to patriotic appeals. The coke output has also increased, but there is not yet as much as is desired. Regular shipments are being made to Mexico and the Pacific coast in addition to Southern and Southwestern consumption. Work on the new by-product plants of the Sloss-Sheffield Steel & Iron Co. and the Birmingham Coke & By-Products Co. has begun.

Old Material.—Scrap dealers assert that they have begun to get the top prices for No. 1 cast from the smaller consumers in the Southern field owing to the growing scarcity of pig iron. The larger consumers are not yet reported as willing to pay the advanced prices, but as cast scrap is scarce the dealers say they are getting rid of their accumulations on the new basis. Other changes are not noted. We quote per gross ton, f. o. b. Birmingham district yards, prices to consumers as follows:

Old steel axles	$35.00 to $36.00
Old steel rails	28.00 to 30.00
Heavy melting steel	27.00 to 27.50
No. 1 railroad wrought	28.00 to 30.00
No. 1 cast	27.50 to 28.50
Old carwheels	29.00
Tramcar wheels	26.00 to 26.50
Machine shop turnings	15.00 to 16.00
Cast-iron borings	15.00 to 16.00
Stove plate	25.00 to 26.00

Small consumers in the Birmingham district and adjacent territory are paying maximum Government prices for cast scrap, viz., $29 in unbroken lots and as high as $34.00 in cupola sizes of 150 lb. maximum, delivered.

St. Louis

ST. LOUIS, Sept. 1, 1918.

Pig Iron.—While some permitted sales of pig iron for first half 1919 delivery are being made, the tonnage continues small, even in the aggregate, being only estimated surplus allotments by furnaces which have been allowed by the Government authorities to take care, directly, of some of their customers who are directly or indirectly engaged in military work. In consequence, the larger consumers are not affected by the offerings which are being made and are still dependent upon their priority orders, all of them being engaged practically to full capacity on work for the military arm of the country. The plans for the co-ordination of the small plants for war work, under the direction of the regional industrial advisor, are progressing steadily, and more capacity is being added to the production almost daily.

Coke.—Allotment of coke to production capacity has prevented any new business appearing in this section either for metallurgical or domestic purposes. Ovens representatives are chiefly engaged in looking after the transportation of allotments and the occasional sale of a small surplus lot which comes into sight.

Finished Iron and Steel.—Finished products are entirely, as for some time past, under the direct supervision of the Government authorities, and deliveries being closely watched in all classes of material in order that the utmost efficiency may be maintained. Movement out of warehouse is as heavy as supplies permit. For stock out of warehouse we quote as follows: Soft steel bars, 4.24c.; iron bars, 4.24c.; structural material, 4.34c.; tank plates, 4.59c.; No. 8 sheets, 5.54c.; No. 10 blue annealed sheets, 5.59c.; No. 28 black sheets, cold rolled, one pass, 6.59c.; No. 28 galvanized sheets, black sheet gage, 7.84c.

Old Material.—The scrap dealers are having difficulty in getting material to meet contracts, let alone new business, and such business as it is possible to transact is handled on the basis of Government prices, the dealers taking the usual commission permitted under the Government regulations. The industries in this district are in need of material, and buying would be heavy if it were possible to locate material to deliver

on purchases. The lists from the railroads are infrequent, and usually light in quantity. Last week the Wabash offered 4000 tons and the Terminal Association 1400 tons, and both lots were taken quickly, and more was wanted, though unavailable. Quotations remain practically at Government figures because of the conditions prevailing. We quote dealers' prices, f. o. b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	$37.00 to $37.50
Old steel rails, rerolling	33.50 to 34.00
Old steel rails, less than 3 ft.	31.00 to 31.50
Relaying rails, standard sections, subject to inspection	55.00 to 65.00
Old carwheels	28.50 to 29.00
No. 1 railroad heavy melting steel scrap	28.50 to 29.00
Heavy shoveling steel	27.00 to 27.50
Ordinary shoveling steel	26.50 to 27.00
Frogs, switches and guards, cut apart	28.50 to 29.00
Ordinary bundled sheet scrap	23.00 to 23.50
Heavy axle and tire turnings	20.50 to 21.00
Per Net Ton	
Iron angle bars	$33.00 to $33.50
Steel angle bars	27.00 to 27.50
Iron car axles	40.00 to 40.50
Steel car axles	40.00 to 40.50
Wrought arch bars and transoms	40.00 to 40.50
No. 1 railroad wrought	28.50 to 29.00
No. 2 railroad wrought	27.50 to 28.00
Railroad springs	29.50 to 30.00
Steel couplers and knuckles	29.50 to 30.00
Locomotive tires, 42 in. and over, smooth inside	27.00 to 27.50
No. 1 dealers' forge	26.00 to 26.50
Cast-iron borings	16.25 to 16.75
No. 1 busheling	25.50 to 26.00
No. 1 boilers cut to sheets and rings	22.50 to 23.00
No. 1 railroad cast scrap	28.00 to 28.50
Stove plate and light cast scrap	23.00 to 23.50
Railroad malleable	26.00 to 26.50
Agricultural malleable	25.00 to 25.50
Pipes and flues	23.00 to 23.50
Heavy railroad sheet and tank scrap	22.50 to 23.00
Railroad grate bars	20.00 to 20.50
Machine shop trimmings	16.00 to 16.50
Country mixed scrap	19.50 to 20.00
Uncut railroad mixed scrap	23.50 to 24.00

San Francisco

SAN FRANCISCO, Aug. 27.

The jobbers are somewhat pessimistic over the way the replacement of stock agreement is working out. They say that their understanding with the Government was that they were to receive in stock a tonnage equal to their last month's sales, but that the mills do not seem to have the same understanding. At least the mills are not replacing their stock promptly, and say that they cannot do so and meet the Government demands. In some materials, sufficient replacements have been received to take care of the trade, but the situation in the matter of sheets is discouraging. The jobbers realize that this is the first month of operation of this plan, and that another month may find the machinery of it running more smoothly; but in the meantime the local market is practically bare of sheets.

Bars.—The bar-iron situation on the Coast is dependent on the scrap situation. So far there has been no shortage of bars, but the mills are watching very carefully what disposition is made of the product, and are selling them only in accordance with the Government's demand for economy in all iron and steel products. The jobbers say they are having no difficulty in keeping a sufficient stock of bars for all legitimate needs.

Structural Materials.—By far the largest order for structural material given on the Coast in recent months was in the letting of the contract for 6200 tons of heavy structurals for the structural shop at the Mare Island Navy Yard. At the same time the contract for 200 tons of structurals for a drawbridge at the same locality was let. The United States Steel Products Co. was the low bidder on each and secured the contract at at $135 a ton f.o.b. Mare Island.

Plates.—Nearly all the plates coming to the Coast are being used in the shipbuilding yards. The jobbers say that their last month's sales have been fairly well taken care of, but that there seems no prospect at present of being permitted to accumulate a stock larger than they now have on hand.

Sheets.—The scarcity of sheets, if anything, is becoming more acute. The jobbers say that the replacement of sheets seems more difficult for the Eastern mills than that of any other material.

Wrought Pipe.—The activities of the Capital Issues Committee in severely scanning all applications for the issuance of securities intended to finance enterprises in which iron and steel is to be used is expected to cut down on the demand for wrought pipe materially. The Hetch Hetchy Water Supply, which is to provide San Francisco with a new source of water, is in the market for wrought pipe, but whether or not the pipe will be provided at this time has not been decided.

Cast-Iron Pipe.—The cast-iron pipe situation is similar to that in wrought iron. The city of Martinez recently secured permission from the Capital Issues Committee to float bonds for improvement of its water works, which the city showed was imperative. The bonds are advertised for sale on Sept. 3, and for the same date bids are called for 6450 ft. of 12-in., 8150 ft. of 6-in., and 20,200 ft. of 4-in. pipe. The city of Richmond has just let a contract for 5000 ft. of 6-in. pipe to the United State Cast Iron Pipe & Foundry Co.

Pig Iron.—Some pig iron is arriving, and this, together with the small amount made on the Coast is taking care of all the imperative needs. While pig iron is scarce, no one is suffering.

Coke.—While there are no large stocks of coke, enough is constantly arriving to take care of all legitimate needs.

Old Materials.—As the machine organized by Emory E. Smith, Pacific Coast Commmisssioner for Scrap Iron and Steel, gets into running order, the scrap situation is being relieved. All the users of scrap who are working on contracts or sub-contracts for the Government are being supplied with sufficient to take care of these needs. Some of the largest users are making arrangements for the substitution of some other raw material for scrap, and the entire matter seems in a fair way of being straightened out. In any event, there seems to be enough scrap in sight to keep all enterprises working on emergency work well supplied with scrap for the next six months and possibly longer. There is no doubt that the situation has been very much cleared up by the placing of authority under a single head, and the entire trade is now co-operating for the benefit of all. We quote prices of scrap on long-ton basis:

Scrap steel for cupola use	$34.00
First grade iron (machinery, railroad, agricultural)	34.00
Second grade (brake shoes)	30.00
Third grade (clean broken stove plates)	28.00
Fourth grade (grate bars, acid scrap free from burnt iron)	20.00

Buffalo

BUFFALO, Sept. 3.

Pig Iron.—About 10,000 tons of iron, foundry and basic grades, have been allocated in this district during the past week. Only about two-thirds of the tonnage assigned to the district by the Government for allocation the previous week was distributed to Buffalo furnaces by the district allocator owing to their filled up condition on previous allotments and contracts. The remainder of the quota had to go to other districts. The Donner Steel Co. is to change one of its North Tonawanda furnaces from foundry iron to malleable within the next week or 10 days. The other North Tonawanda furnace of the company will remain on ferromanganese and the two Buffalo stacks on basic. The Burden Iron Co. furnace at Troy, now controlled and operated by the Buffalo Union Furnace Co., is still working on ferromanganese, as it has been for the past several weeks and will continue on this product for some time, as long probably as it can get material to make it. Furnaces of the district are not booking any business except by allocation, both producers and consumers apparently believing that the booking of 1919

business will be of no special benefit if not for application on urgent Government work, which would in any event be covered by allocation at the proper time. We quote the Government price schedule, f.o.b. furnace, Buffalo:

No. 1 foundry, 2.75 to 3.25 silicon	$34.50
No. 2 X, 2.25 to 2.75 silicon	33.50
No. 3 foundry, 1.75 to 2.25 silicon	32.50
Gray forge	32.00
Malleable	33.50
Basic	32.00
Lake Superior charcoal, regular grades, f.o.b. Buffalo	37.50

Finished Iron and Steel.—Pressure for Government requirements to meet military and naval necessities has increased so rapidly recently that there is a constantly growing and acute shortage of steel for all other purposes than direct war needs. Many inquiries from customers requiring bars and structural materials for priorities as high as B 2 are being declined by sales agencies because of inability of their operating departments to make shipment of same during the remainder of the year. One large producing interest reports operations on materials that might be used for commercial purposes had fallen to below 40 per cent of what it had expected to turn out, and it is now unable to entertain commercial orders even for replenishment of jobbers' stocks. The filling of Government demand for shell steel, shipbuilding and railroad material is taking up such a large part of productive capacity that production of bar material, tin plate, tubes and wire has to be curtailed. Government orders for barbed wire now on books are now so large that deliveries cannot be completed this year and will have to be carried over well into next year. Large Government orders for wire nails and wire rods are also on producers' books. Bids are to be asked as soon as practicable for structural steel for three public school buildings at Buffalo and for a hospital building for the Sisters of St. Francis, Auburn, N. Y., requiring about 100 tons for each structure.

Old Material.—Active demand continues for all grades of scrap, with a pronounced scarcity reported in many lines. It is expected, however, that the ruling suppressing the practice of sorting out and selling the better grades of melting steel as "unguaranteed low phosphorus" at a higher than regulation price will soon result in the augmenting of the supply of heavy melting steel. The trade is also said to be expecting another important Government ruling soon, along the lines of the new regulations affecting turnings and low phosphorus, which will be even more sweeping in its nature than the regulations recently issued. The current price schedule is as follows, per gross ton, f.o.b., Buffalo:

Heavy melting steel	$29.00
No. 1 low phosphorus, heavy, 0.04 and under	39.00
Low phosphorus, 0.04 and under	36.50
Low phosphorus, not guaranteed	34.00
No. 1 railroad wrought	34.00
No. 1 railroad and machinery cast	34.00
Iron axles	$44.00 to 46.00
Steel axles	44.00 to 46.00
Carwheels	29.00
Railroad malleable	34.00
Machine shop turnings	17.00 to 17.50
Heavy axle turnings	24.00
Clean cast borings	18.00 to 19.00
Iron rails	36.00 to 37.00
Locomotive grate bars	27.50 to 28.00
Stove plate	27.50 to 28.00
Wrought pipe	27.00 to 28.00
No. 1 busheling scrap	29.00 to 30.00
No. 2 busheling scrap	21.00 to 23.00
Bundled sheet stamping scrap	21.00 to 23.00

British Steel Market

Blast-Furnace Fuel Situation Easier—Steel for Shipyards Well in Hand

(By Cable)

LONDON, ENGLAND, Sept. 4.

Blast furnaces are working better and the fuel situation is less troublesome. Demand for pig iron is excellent. Steelmakers are fairly well ahead in deliveries for shipyard requirements. In general pressure is unrelaxed. Ferromanganese has sold for delivery in Canada at $260. Current quotations on various products are as follows:

Tin plate, coke, 14 x 20; 112 sheets, 108 lb., f.o.b. Wales, 33s. 6d.

Ferromanganese, $260 to $265, c.i.f. for export to America and Canada; £26 10s. for British consumption.

On other products control prices per gross ton are:

Hematite pig iron, East Coast, £6 2s. 6d.; West Coast, £6 7s. 6d.

Cleveland pig iron (export), £5 5s. for No. 1 and £6 6s. for basic. Domestic prices, 6s. below these figures.

Steel plates, ship, bridge and tank, £11 10s. to £17, according to size.

S. M. boiler plates, basis, £12 10s.

Bar iron, standard quality, basis £14 15s.; marked £17, net.

Sheet and tin plate bars, £10, 7s. 6d.

Blooms and billets for rerolling (ordinary), £10 7s. 6d.; special quality, £11.

Wire rods, £21 10s. net, basis.

New York

New York, Sept. 3.

Pig Iron.—Makers of charcoal iron are reported to have held a meeting recently to consider the price situation, and it is understood they will ask for higher prices for fourth quarter. Distributers of iron have received little definite information from their principals as to what action, if any, has been taken toward seeking higher prices on other grades of iron. It is assumed that some of the smaller furnaces, at least, will present claims for higher prices. Some of them, it is said, are not coming out whole on present prices because of increasing costs. The Virginia operators may ask for an advance covering that district, even though a general price advance is not allowed. Selling for next year is at a minimum. There is said to be a little quiet selling, but for obvious reasons not much is being said about it. A distributer of Lake Superior charcoal iron will probably begin booking business this week on that grade for the first half. We quote prices as follows for tidewater delivery on Northern and Southern grades:

No. 1 X	$35.40
No. 2 X	34.00
No. 2 plain	33.50
No. 2 X Virginia	37.90
No. 1 Southern (all rail)	42.20
No. 2 Southern (all rail)	40.70

Ferroalloys.—In the last week there has been a somewhat better inquiry for ferromanganese for delivery in 1919, but it has been confined largely to lots under 1000 tons and is as yet by no means of the proportions expected when the urgent call of the Sub-Committee on Alloys was issued some weeks ago. One dealer reports a fairly large number of inquiries ranging up to 1000-ton lots. A Middle Western consumer is inquiring for 1100 tons of 70 per cent alloy for delivery in the first half and also for 3600 tons of 35 to 40 per cent alloy. If this grade is not available, 18 per cent spiegeleisen will be accepted in an amount equal to the other in the total manganese involved. Another inquiry of 1500 tons of 70 per cent alloy, before the market a week ago, is expected to be satisfied this week, also for delivery next year. The same consumer will also purchase 2500 tons of spiegeleisen for the same delivery. The market is firm at $250 for 70 per cent alloy with $3.50 per unit added or subtracted above or below this standard as against $4 per unit a short time ago. This lower quotation is largely the result of the offerings of one producer but it is also regarded as nearer the true value of the manganese content on the $250 basis for 70 per cent alloy. There is very little demand for spiegeleisen outside of that noted above. For 50 per cent ferrosilicon, demand for nearby delivery is light with the quotation nominal at about $160 per ton, furnace. There is very little inquiry yet for delivery in 1919, the quotation for which is largely nominal at about $145 to $150, delivered. Ferrotungsten is now quoted at about $2.35 to $2.45 per lb. of contained tungsten, New York, with the ore concentrates selling at between $20 to $25.50 per unit in 60 per cent material. We quote ferrovanadium at $4 to $5, Pittsburgh, per lb. of contained vanadium for prompt delivery in small lots, but very little is available, large quantities going into steel on Government orders. Ferro-carbon-titanium, 15 to 18 per cent, is selling at $200 per net

ton in carload lots, at $220 per ton in lots between one ton and a carload, and at $250 per ton in lots less than a ton, f.o.b. Suspension Bridge, N. Y.

Cast-Iron Pipe.—There are no public lettings of importance, but a fair amount of private work is being done considering present conditions. Bids will be opened on Sept. 6 by the Navy Department for 114 tons of 4-in. pipe. Government prices, including freight, are as follows: $61.75, New York, for 6-in. and heavier; $64.75 for 4-in.; $71.75 for 3-in., with $1 additional for Class A and gas pipe.

Old Material.—The Sub-Committee on Scrap Iron and Steel, American Iron and Steel Institute, may adopt a new ruling which will strictly classify cast-steel car bolsters as heavy melting steel. Some scrap dealers have been selling this material as so-called "unguaranteed low phosphorus," thus obtaining $34 a ton for it. A change is also said to be pending which will affect borings and turnings, but no definite information is yet available as to what this new ruling will be. There is an insistent demand from New England for cast scrap of all kinds and much of that material is not leaving that section which ordinarily would come to nearby consumers. The Watertown Arsenal, Watertown, Mass., is now taking a good deal of low phosphorus scrap for making gun forgings. We quote buying prices of dealers and brokers per gross ton New York as follows:

Heavy melting steel	$26.20
Rerolling rails	30.80
Relaying rails	$60.00 to 70.00
Iron and steel car axles	43.70
No. 1 railroad wrought	30.80
No. 1 railroad wrought, cut to not less than 10 in. or over 24 in.	35.80
Wrought-iron track scrap	28.80
Forge fire	25.00 to 25.50
No. 1 yard wrought, long	29.80
Light iron	10.00 to 11.00
Cast borings (clean)	16.25 to 16.50
Machine-shop turnings	16.25 to 16.50
Mixed borings and turnings	16.25 to 16.50
Iron and steel pipe (1 in. minimum diameter), not under 2 ft. long	29.80
Stove pipe	26.20
Locomotive grate bars	26.20
Malleable cast (railroad)	31.20
Old carwheels	26.20

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, are:

No. 1 machinery cast	$34.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	34.00
No. 1 heavy cast, not cupola size	29.00
No. 1 cast (radiators, cast boilers, etc.)	29.00

Finished Iron and Steel.—The steel trade is not a unit as regards the influence of the recent labor award on the Bridgeport cases. Those who feel that the ruling will be forced subsequently on the steel trade claim that there will be no way out but an advance in prices for the fourth quarter. A larger number probably feel, however, that the influence of the Bridgeport cases is exaggerated and no unit price increase can be looked for on this account. It remains that many products are being manufactured at a loss, not excepting plates at 3.25c., Pittsburgh basis, even on some fully integrated mills. The amount of fabricated steel work put under contract in August does not appear to be large. Only one sizable award is learned of, the boiler house for the Baltimore electric lighting system, 500 tons, placed with the Chesapeake Iron Works. A concentrating plant for the Phelps Dodge Co., Bisbee, Ariz., 1600 tons, is up for figures. The opening of bids on the addition to the machine shop at the Mare Island Navy Yard, 400 tons, was postponed to Sept. 3. We quote mill shipments as follows: Steel bars, 3.145c.; shapes, 3.245c.; plates, 3.495c.; and bar iron, 3.745c., all New York. Out-of-store prices are 1c. higher.

The Birmingham Chamber of Commerce has named a committee to go to Washington and look further into the project of locating a branch plant of the Baldwin Locomotive Works in the Birmingham district. It is understood that the Baldwin company has itself broached the matter to the Government with a view to Government sanction and financial aid.

Cincinnati

CINCINNATI, Sept. 3—(*By Wire*).

Pig Iron.—Production has been speeded up to a considerable extent both in the South and in the Ironton district, due principally to the favorable weather conditions. The labor shortage is a serious matter, and no immediate relief is in sight. All Southern iron is now off the market, with the exception of some high silicon that probably could be bought for first half shipment. It is understood that a few interests that came into the market last month sold a considerable tonnage, but the furnaces were able to take care of only a limited tonnage of the amount of business sent in. A southern Ohio producer is taking a few orders for foundry iron from regular customers, but it is stated that the tonnage available for this purpose has been almost exhausted, although many melters have been placed on the non-essential list. Cutting down shipments to these firms will hardly relieve the situation, if reports received by different selling agencies from their principals can be relied upon. A very encouraging feature is the prompt movement of iron after it has been loaded. The shortage of malleable almost equals that of basic, and within the past few days some urgent calls have been received from foundries having railroad work in hand. There has not been such a strict allocation of iron lately because all of the available tonnage had been previously distributed.

Based on freight rates of $3.60 from Birmingham and $1.80 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, No. 2 foundry and No. 2 soft	$36.60
Southern Ohio, No. 2	34.80
Basic, Northern	33.80

Finished Material.—As a result of restricted shipments from the mills, the local jobbers are not able to fill all orders sent them. In fact the situation is even worse than it was in the first part of August when word had been passed around that the jobbers would be given some support. Depletion of stocks has now reached the point where it is serious. All the building operations now going on are for additions to plants that are engaged in war work, or for structures that shelter workmen who are employed in these plants. The shortage of builders' hardware is about as bad as the curtailment in shipments of reinforcing concrete bars needed for plants that are being extended to take care of strictly war work. Sheet metal contractors are having a hard time to get galvanized sheets even though some of them can produce urgent priority orders. The sheet mills in this vicinity are devoting all their time to filling orders that come either directly or indirectly from Washington. Barbed wire cannot be had and wire nails have become so scarce that shipments are distributed with a great deal of care by the few fortunate jobbers who have any in stock. Mill representatives report that only iron bars can be shipped with any degree of promptness and that 30 days is a good delivery for this commodity.

The following are local jobbers' prices: Steel bars and small structural shapes, 4.13c. base; large rounds and squares 2 in. and over, 4.23c. base; plates, 4.48c. base; No. 10 blue annealed sheets, 5.48c.; steel bands, 3/16 in. and lighter, 4.98c. base (using the new band list). Reinforcing concrete bars, 4.23c., and wire nails, $4.25 to $4.50 per keg base.

Coke.—The holiday has shut off wire reports from the different producing districts, but those received by mail indicate that the ovens will not be able to take care of the growing demand for foundry coke. An effort is being made by some foundries to stock up before the winter season begins, but none has been able to lay in anything like a sufficient supply for the remainder of the year. As far as the furnaces are concerned, they rely on the Government authorities to furnish them with fuel necessary to carry on their work. Lately shipments from the Connellsville field have improved considerably, but those from Wise County and Pocahontas districts are running behind. This is probably due to the distribution of coke from those districts to consumers farther east.

Old Material.—Although there is an urgent demand for all kinds of scrap, prices have not been advanced. This call for old material has strengthened quotations,

but the maximum Government quotations have not yet been reached on a number of grades. The foundries are especially active in trying to secure scrap for future needs. The following are dealers' prices f.o.b. at yards, Cincinnati and southern Ohio, in carload lots:

	Per Gross Ton
Bundled sheet scrap	$21.50 to $32.50
Old iron rails	33.50 to 34.00
Relaying rails, 50 lb. and up	44.50 to 45.00
Rerolling steel rails	32.00 to 32.50
Heavy melting steel scrap	27.50 to 28.00
Steel rails for melting	27.50 to 28.00
Old carwheels	29.00 to 29.50
	Per Net Ton
No. 1 railroad wrought	$29.50 to $30.00
Cast borings	13.50 to 14.00
Steel turnings	14.50 to 15.00
Railroad cast	25.00 to 25.50
No. 1 machinery	29.50 to 30.00
Burnt scrap	17.50 to 18.00
Iron axles	40.00 to 40.50
Locomotive tires (smooth inside)	35.50 to 36.00
Pipes and flues	21.00 to 21.50
Malleable cast	24.50 to 25.00
Railroad tank and sheet	18.50 to 19.00

Cleveland

CLEVELAND, Sept. 3—(*By Wire*).

Iron Ore.—Iron ore shipments fell off nearly 1,000,000 tons in August as compared with July owing to the diversion of a large number of boats from the ore trade to the Lake Michigan grain trade. The Lake movement for the month amounted to 9,725,331 gross tons, as compared with 10,659,203 tons in July and 10,146,786 tons in August, 1917. However, with the decrease in tonnage last month's shipments until Sept. 1 hold the record for that period, amounting to 39,334,264 tons, as compared with 39,215,864 tons during the corresponding period of 1916. The demands of the grain trade will be heavy from now on, but no doubt is expressed that the Lake boats will be able to bring down all the ore required.

Old range Bessemer, $6.40; old range non-Bessemer, $5.65; Mesaba Bessemer, $6.15; Mesaba non-Bessemer, $5.50.

Pig Iron.—Allocations of pig iron by the pig iron committee, after showing a decline for two weeks, jumped last week to a total of 75,000 tons, making the total allocations during the four-month period from May 1 to Sept. 1 834,000 tons. This is only a little less than 25 per cent of the total production of the merchant furnaces. Basic led during the week with allocations of 31,000 tons to four or five consumers. Allocations of foundry iron were 27,000 tons, low phosphorus 9800 tons, malleable 4700 tons and Bessemer 1500 tons. Several allocations were made for iron for Cleveland foundries which have had the greater part of their supply cut off by changing one of the Cleveland furnaces from foundry to basic iron to fill a large Government order for England. The pig iron committee has now about 100 lots of iron up for allocation and new Government requirements are coming out to the extent of about 30 lots for allocation each day. While buying for next year has subsided, there is still a fair amount of inquiry for foundry and malleable iron for the first half, but very few sales are being made, as producers are in most cases declining to take on additional tonnages.

Bessemer	$36.60
Basic	33.40
Northern No. 2 foundry	33.40
Southern No. 2 foundry	38.00
Gray forge	32.40
Ohio silvery, 8 per cent silicon	47.90
Standard low phosphorus, Valley furnace	53.00

Coke.—Cleveland by-product plants have no coke to offer, having sold up all their available output for some time. Inquiry is rather light.

Bolts and Nuts.—Inquiry for bolts and nuts continues fairly active, although no large orders are being placed. The supply of steel is becoming shorter, so that production shows a further falling off and deliveries are getting further behind.

Finished Iron and Steel.—Jobbers are now securing better shipments of steel bars and structural material as a result of the action of the Government in looking after this trade and they are filling their stocks, which were nearly cleaned out. While the range of sizes is not complete, the increase in jobbers' stocks has eased up the local situation. Some plates are also moving to the warehouses, but these are still very tight. With increased stocks, warehouse sales show a considerable gain. Local jobbers are now following a uniform policy in accepting orders accompanied by a notation or letter indicating for what purpose the steel is to be used. One jobbing house has previously required an affidavit with each order. Mill inquiry from consumers is rather light, nearly all orders being Government allocations. There is a good demand for structural material in small lots for essential building work. The inquiry for shell discard from rerolling mills and brokers is very heavy. The implement trade in this territory is now being supplied very largely with steel rolled from discard and would be in a very unsatisfactory condition if it had to depend even on Bessemer steel. Rerolling mills are well filled up and are getting further behind on deliveries. The demand for bar iron is active, coming largely from railroads and car builders. Much delay is still being caused by improper filling out of priority certificates and affidavits, and in some cases to save time mill agencies are sending orders subject to priority ratings to be secured later. Charcoal iron tubes are not moving well, consumers claiming that prices are prohibitive and that they can still secure steel tubes.

Steel bars, 4.07c.; plates, 4.42c.; structural material, 4.17c.; No. 10 blue annealed sheets, 5.42c.; No. 28 black sheets, 6.42c.; No. 28 galvanized sheets, 7.67c.

Old Material.—Cupola cast scrap is in good demand at some points adjacent to Cleveland, although not active here. The price is very firm and dealers are making sales at $34, the Government price, plus commission. Borings and turnings are in good demand at the maximum price. About 1000 tons previously sold for use in local blast furnaces has been resold for shipment to a western Pennsylvania consumer under a Government permit, the buyer paying the Government price and difference in freight. Stove plate is in good demand and scarce and the price on this grade has advanced fully $1 a ton. Sales are reported at $25.50 net and $29 gross. Mills are still taking all the heavy steel scrap that is being offered. Busheling is inactive. Yard dealers are moving their stocks slowly because of the scarcity of labor to handle it. We quote, delivered consumers' yards in Cleveland and vicinity, as follows:

	Per Gross Ton
Steel rails	$28.00 to $29.00
Steel rails, under 3 ft.	34.00
Steel rails, rerolling	34.00
Iron rails	39.00
Iron car axles	46.50
Steel car axles	46.50
Heavy melting steel	29.00
Cast borings	19.00
Iron and steel turnings and drillings	19.00
Hydraulic compressed sheet scrap	28.00 to 29.00
No. 1 railroad wrought	34.00
Cast-iron carwheels, unbroken	29.00
Cast-iron carwheels, broken	34.00
Agricultural malleable	29.00 to 30.00
Railroad malleable	34.00
Steel axle turnings	24.00
Light bundled sheet scrap	24.50 to 25.00
Cast-iron scrap	29.00
Cast-iron scrap, broken to cupola size	33.00 to 34.00
No. 1 busheling	30.00 to 31.00
	Per Net Ton
Railroad grate bars	$24.00 to $25.00
Stove plate	24.00 to 25.00

The production of nitrates for the Government will not be affected by the recent order causing the temporary suspension of work on the water-power development at the Muscle Shoals nitrate plants, according to a statement just issued by the Ordnance Department. The order will stop only the erection of the plant, power from which was not anticipated for some four or five years. The development of this water-power project was undertaken by the War Department to utilize the nitrate plants in agricultural pursuits after the war.

IRON AND INDUSTRIAL STOCKS

A More Active Market on News from the Western Front—Steel Recovers Most of Its Dividend

NEW YORK, Sept. 4.

The dead level to which stocks had fallen and the entire absence of interest in the market was broken on Friday and Saturday by an advance of moderate proportions. This was due as much as anything to the response to war news—until then almost unheeded, despite the fact that this had been favorable and bullish for some weeks. But there still exists what may be termed brakes holding back any decided bull movement and this is the money situation and the apparent decision of those in control to limit loans in this direction. It is believed, however, that any really spectacular victory for the Allies, and especially the American Army, will be powerful enough to prevent a rise in values of decided proportions, even on a diminished volume of business.

Steel common sold ex-dividend on Friday, Aug. 30, opening at 110½ and closing at 110⅛, a net loss of ⅛. A somewhat spectacular advance was recorded yesterday, Sept. 3, when it rose to 116, closing at 115¾. Other steel stocks also experienced advances, all due to the cheering news from the Western front. Copper stocks remained firm for the week under review, while rail shares took a decided turn for the better, led by Reading, Union Pacific and Southern Railroad.

Liberty 3½ per cent bonds fell to $101.50 in the week, rising again yesterday to $102. The others were firm.

The range of prices in active iron and industrial stocks from Tuesday of last week to Wedesday of this week was as follows:

Allis-Chalm. com.	32⅝- 33⅜	Int. Har. Corp. com....	65
Am. Can com...	46½- 47⅝	Lackawanna Steel	85 -85¾
Am. Can pf.....	93½- 93¾	Lake Super. Corp.	18 -18⅝
Am. Car & Fdry. com.	85 - 86⅞	Midvale Steel ...	52⅝- 54
Am. Car & Fdry. pf.	109¾-110	Nat. Enam. & Stm. com.	52 - 52¾
Am. Loco. com..	66 - 67½	N. Y. Air Brake..	127 -129½
Am. Loco. pf....	98 - 98½	Nova Scotia Steel.....	66
Am. Radiator com.....	128½	Pressed Stl. com.	70¼- 71⅞
Am. Ship com...	129 -132½	Ry. Steel Spring com.	67½- 70
Am. Steel Fdries.	77 - 81¾	Ry. Steel Spring pf.	102½
Bald Loco. com..	92½- 95¼	Republic com. ...	91⅜- 94¼
Beth. Steel com..	85 - 86½	Republic pf.	102
Beth. Stl. Cl. B.	84½- 86	Sloss com.	60¾- 62½
Central Fdry. com.....	32	Superior Steel ..	43 - 43½
Central Fdry. pf.....	43½	Un. Alloy Steel..	38 - 39
Chic. Pneu. Tool.	69 - 69¾	U. S. Pipe com.....	15
Colo. Fuel	46½- 49¼	U. S. Pipe pf.....	44
Cruc. Steel com..	68 - 69¾	U. S. Steel com..	109½-116½
Crucible Steel pf.....	91	U. S. Steel pf...	110½-111⅛
Gen. Electric ...	145¾-147¼	Va. I. C. & Coke.....	72
Gt. No. Ore Cert.	32¼- 33¼	Warwick	8¼
Gulf States Steel.	79¾- 85	Westingh. Elec. ..	43⅝- 44¼
Int. Har. of N. J. com.	128 -128¼		

The plant of the Pacific Coast Steel Co., Seattle, Wash., located at West Seattle, was closed on August 30 by a strike of nearly the entire force of the 1300 employees. The strike followed a failure of the company officials and the various unions of its employees to reach an agreement in negotiations for new working contracts. The Mediation Service of the United States Department of Labor made unsuccessful attempts to prevent the walk-out. The plant has been working almost exclusively on Government contracts.

A meeting of mid-western sections of the American Society of Mechanical Engineers, including Cincinnati, St. Louis, Chicago, Milwaukee, Detroit, Birmingham and Indianapolis, is to take place in the last mentioned city on Oct. 25 and 26. It is expected that the Indiana Engineering Society and the Indianapolis-Lafayette section of the American Institute of Electrical Engineers will join in with the arrangements.

The first of the steel ocean-going cargo vessels being built on account of the Imperial Munitions Board on the canal at Welland, Ont., has been successfully launched.

STEEL STOCK SURVEY

Census Bureau Collecting Facts — Government Will Retain Neville Island Plant

WASHINGTON, Sept. 4 (*By Wire*).—The War Industries Board is making a census of all the steel stock on hand throughout the United States down to the smallest holding. The work is being done through the Census Bureau, which has sent out a questionnaire to more than 40,000 manufacturers.

Will Retain Neville Island Plant

The Secretary of War announced that after the war the Government will retain the Neville Island plant which is now being built by the Steel Corporation for the Government at an investment of $50,000,000. He said this was the biggest plant of the kind ever conceived. It covers 1000 acres. It will build guns of not less than 14 in. He said also that 12 forging plants are at work on ordnance for the Government. So far, 250 155-mm. howitzers have been shipped to France. Twenty-five thousand machine guns are being produced monthly, including 6000 Browning heavies and from 8000 to 9000 Browning light automatic rifles. The production of pistols and revolvers is between 50,000 and 60,000, but is being expedited. The Government also is making 1200 motor tractors per month.

By-Product Coke Reduced

The Fuel Administration has ordered a flat reduction of 30c. a ton for coke produced in by-product ovens except in the States of Alabama and Washington. Under the order, the base price of by-product coke is $5.70 for run of ovens and $6.70 for selected foundry. Exeept where otherwise provided, the maximum price f.o.b. cars at point of production for each grade of by-product coke is to be the sum of the base price for that grade and the freight rate from the competing beehive coke district which takes the lowest freight rate to the point where such by-product coke is produced.

Because the housing and transportation conditions in 60 towns and cities where war supplies are being manufactured are so congested, the General Staff has advised all supply bureaus to give no more contracts to these cities if they can be placed elsewhere. This instruction has gone especially to the Quartermaster's Corps because of the relative flexibility of its contracts.

Weirton Steel Co. Takes Over Phillips Steel & Tin Plate Co. Plants

PITTSBURGH, Sept. 3 (*By Wire*).—Weirton Steel Co., recently organized under a West Virginia charter, has taken over and will operate all the properties of the Phillips Sheet & Tin Plate Co., consisting of hoop and band, cold-rolled strip steel and small shape mills, also a tin plate plant, all at Weirton, W. Va., containing 26 hot-tin mills, a tin plate plant at Clarksburg, W. Va., having 12 hot tin mills and another plant at Steubenville, Ohio, having 12 hot-tin mills. The new company will have a capital of $30,000,000 and will also operate the new blast furnace being built at Weirton, to have a daily capacity of 600 tons of iron. Rapid progress is being made on the building of this furnace, the Government being badly in need of pig iron and having furnished the company priorities for all the equipment for the furnace. All material is being delivered very promptly. The stack is expected to be ready for blast not later than July 1 next year and may possibly be ready before that time.

The officials of the Weirton Steel Co. are E. W. Mudge, chairman of the board; E. T. Weir, president; D. M. Weir, vice-president; W. H. Baldridge, vice-president; John Williams, vice-president; John J. Watson, secretary, and A. E. Morse, treasurer.

The company owns a very large acreage of undeveloped coal lands in the Connellsville region and later will likely build by-product coke ovens at Weirton to supply the new blast furnace with coke.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St.	New	St.
Aug.	Lake	lytic	York	York	Louis	York	Louis
28	26.00	26.00	*85.00	8.05	7.75	9.50	9.25
29	26.00	26.00	*83.00	8.05	7.75	9.50	9.25
30	26.00	26.00	*83.00	8.05	7.75	9.50	9.25
31	26.00	26.00	....	8.05	7.75	9.50	9.25
Sept.							
3	26.00	26.00	*83.00	8.05	7.75	9.37½	9.12½

*Nominal.

NEW YORK, Sept. 4.

The markets are all quiet but pervaded with a strong undertone. Deliveries of copper to meet war demands is the sole aim of that market. Tin continues quiet and easier. Lead is as scarce as ever. Spelter has experienced a lull in demand but is fairly firm. Antimony is a little easier.

New York

Copper.—There are persistent reports that the production of crude copper is not as large as it ought to be to meet all the needs of the future. The labor situation is blamed for this largely. The refined copper output is evidently large at present, estimated thus far this year at not less than 200,000,000 lb. per month, as compared with the 1917 average of nearly 205,000,000 lb. per month. Exports in 1918 have been nearly 30 per cent less than in 1917, which has helped the situation in this country somewhat, but unless the output of crude copper is maintained at a high average a deficiency is possible some months to come. The large output of refined copper is assisted by accumulations of crude metal earlier in the year at Eastern refineries. The general situation is unchanged. Sales are few now as consumers are well covered to Nov. 1, when the present price of 26c. per lb. expires. Buying beyond that date is only for delivery at the price ruling then. Jobbers are selling at 27.35c. per lb. in lots of less than 5 tons.

Tin.—The situation is still as quiet as it has been for some weeks. No sales for any position have been heard of and prices are gradually receding on Eastern shipments, as well as for spot positions also. For the latter, however, the supply is very limited with the quotation nominal at 83c., New York, as compared with 88c. a week ago. For shipment from the East the metal could perhaps be obtained for 76.50c. per lb. against 78c. one week ago. Underlying conditions are unchanged, buyers still awaiting the outcome of the London conferences concerning which there are no developments made public. The only event of the week has been talk about the fixing of a price for tin by our own Government at 76.25c. per lb., but whether with New York or the Far East as a base is not known. Investigation of this has found the report to be groundless. Were it so, importers of tin would be among the first to be notified. Price fixing of tin is possible only by co-operation between the American and British governments. Arrivals of tin at Atlantic ports for the month to Aug. 29 inclusive have been 2500 tons, with 3535 tons received at Pacific ports to Aug. 24 inclusive. The London market still declines. Spot Straits yesterday was quoted at £353 10s. against £367 10s. per ton a week ago.

Lead.—The market continues to drift and the scarcity of the metal is still very pronounced with no próspect of any nearby relief. The sales and distribution are under the strict control of the lead producers' committee, an unofficial organization. The market is a close parallel to that of copper, except that the Copper Producers' Committee is a Government-created body. The agreed prices above which no sales are permitted are 7.75c., St. Louis, or 8.05c., New York, for carloads and larger lots, with 8.55c., the maximum price for dealers selling less than carloads.

Spelter.—The market is experiencing a slight reaction after the forward movement of the last week or two. It is, however, but slightly lower, prime Western being quoted nominal yesterday at 9.12½c. to 9.25c., St. Louis, or 9.37½c. to 9.50c. for nearby. For fourth quarter the quotation seems to be unchanged and firm at 9c., St. Louis, or 9.25c., New York. There is very little inquiry. For September and into October leading producers are fairly well sold. There has been a sale for fourth quarter at 8.85c., St. Louis, but it is not regarded as representative of the market. The Government's weekly report of the market shows an increase in the output of Grade A and a reduction in that of the lower grades.

Antimony.—Demand is very light and the market is slightly lower for both spot and nearby delivery at 14.12½c. to 14.25c., New York, duty paid.

Aluminum.—Government maximum prices control sales of No. 1 virgin metal, 98 to 99 per cent pure, and of scrap at 33c. per lb. in 50-ton lots, at 33.10c. per lb. in 15 to 50-ton lots, and at 33.20c. per lb. in lots of 1 to 15 tons.

Old Metals.—The market is quiet. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	26.00
Copper, heavy and wire	25.00
Copper, light and bottoms	23.00
Brass, heavy	17.75
Brass, light	13.25
Heavy machine composition	26.00
No. 1 yellow rod brass turnings	14.75 to 15.25
No. 1 red brass or composition turnings	23.50
Lead, heavy	7.875
Lead, tea	6.50
Zinc	7.25

Chicago

Sept. 3.—Of copper there is continued heavy consumption for war work. Lead is in tremendous demand, with practically none obtainable on new orders except for war necessities, but a little ease is expected to come soon. In spelter there is but little activity, despite the fact there are offerings at lower prices. The tin market is slow, and shows an easier tendency, the supply being found adequate. Antimony continues fairly active and its price is firm.

We quote copper at 26c. for carloads and 27.30c. for part carloads; tin, 88c. to 90c.; lead, nominal at 7.85c.; spelter, 9c. to 9.25c.; antimony, 15.50c. to 16c. On old metals we quote copper wire, crucible shapes, 22.50c.; copper clips, 21.75c.; copper bottoms, 21.50c.; red brass, 22.50c.; yellow brass, 15.50c.; lead pipe, 6.25c.; zinc, 5.75c.; pewter, No. 1, 45c.; tinfoil, 50c., and block tin, 60c.

St. Louis

Sept. 2.—The non-ferrous metals market has been quiet but firm with the close to-day on car lots as follows: Lead, 7.75c.; spelter, 8.90c. On less than car lots the figures were: Lead, 8.25c.; spelter, 9.50c.; tin, $1.10, and none available; copper, 27.85c.; Asiatic antimony, 16c. In the Joplin district, ores were fairly well held, and zinc blende sold on the second grades basis of 60 per cent metal, up to $60 per ton, with the usual amount of top grade ore going at $75 per ton. The average for the week for the district was $57 per ton. Calamine was steady at $30 to $40 per ton, basis of 40 per cent metal, with the average for the week for the district at $34 per ton. Lead ore was firm at $101 per ton for top-grade ore, basis of 80 per cent metal, with the average for the week for the district at $100 per ton. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 10c.; heavy yellow brass, 14c.; heavy red brass, 19.50c.; light copper, 18.50c.; heavy copper and copper wire, 20c.; pewter, 30c.; tinfoil, 60c.; lead, 6c.; zinc, 5c.; tea lead, 5c.; aluminum, 20c.

The Baldwin Locomotive Works, Broad and Spring Garden streets, Philadelphia, is now producing locomotives at its local works at the rate of over 10 completed engines a day, or between 300 and 350 a month. It is said that the total production for the current year at the plant will break all records. The company has recently purchased a tract of about 200 acres adjoining its works at Eddystone for a consideration said to be about $300,000, to provide for proposed expansion. It is understood that the company is planning to increase its working force at this works by about 5000 men.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

An advance in freight rates of 25 per cent from Pittsburgh on finished iron and steel products, including wrought iron and steel pipe, went into effect June 25, 1918. The rates from Pittsburgh, in carloads, to points named, per 100 lb. are as follows: New York, 24.5c.; Philadelphia, 23c.; Boston, 27c.; Buffalo, 17c.; Cleveland, 17c.; Cincinnati, 23c.; Indianapolis, 25c.; Chicago, 27c.; St. Louis, 34c.; Kansas City, 59c.; St. Paul, 49½c.; Denver, 99c.; Omaha, 59c.; minimum carload, 36,000 lb. to four last named points; New Orleans, 38.5c.; Birmingham, 57.5c.; Pacific Coast, $1.25; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is $1.315, minimum carload 40,000 lb.; and $1.25, minimum carload 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 50c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 50c., minimum carload 46,000 lb.; to St. Paul and Minneapolis, 49.5c., minimum carload 46,000 lb.; Denver, 99c., minimum carload 46,000 lb. A 3 per cent transportation tax applies. On iron and steel items not noted above, rates vary somewhat and are given in detail in the regular railroad tariffs.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in. angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, structural sizes, 3c.

Wire Products

Wire nails, $3.50 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basis wire, $3.35 per 100 lb.; annealed fence wire, Nos. 6 to 9, $3.25; galvanized wire, $3.95; galvanized barb wire and fence staples, $4.35; painted barb wire, $3.65; polished fence staples, $3.65; cement-coated nails, $3.40 base; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 47 per cent off list for carload lots, 46 per cent for 1000-rod lots, and 45 per cent off for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets.....$4.40 base
Large boiler rivets.....$4.50
7/16 in. x 6 in. smaller and shorter rivets..50-10 per cent off list
Machine bolts h.p. nuts, ⅜ in. x 4 in.:
Smaller and shorter, rolled threads....50-10-5 per cent off list
Cut threads.....50-5 per cent off list
Larger and longer sizes.....40-10 per cent off list
Machine bolts, c.p.c. and t. nuts, ⅜ in. x 4 in.:
Smaller and shorter.....40-10 per cent off list
Larger and longer.....35-5 per cent off list
Carriage bolts, ⅜ x 6 in.:
Smaller and shorter, rolled threads.....50-5 per cent off list
Cut threads.....40-10-5 per cent off list
Larger and longer sizes.....40 per cent off list
Lag bolts.....50-10 per cent off list
Plow bolts, Nos. 1, 2, 3.....50 per cent off list
Hot pressed nuts, sq., blank.....2.50c. per lb. off list
Hot pressed nuts, hex., blank.....2.30c. per lb. off list
Hot pressed nuts, sq., tapped.....2.30c. per lb. off list
Hot pressed nuts, hex., tapped.....2.10c. per lb. off list
Cold punched nuts, sq. and hex. nuts, blank.....2.25c. per lb. off list
Cold punched and t. sq. and hex. nuts, tapped.....2.00c. per lb. off list
Semi-finished hex. nuts:
⅜ in. and larger.....60-10-10 per cent off list
7/16 in. and smaller.....70-5 per cent off list
Stove bolts.....70-10 per cent off list
Stove bolts.....2½ per cent extra for bulk
Tire bolts.....50-10-5 per cent off list

The above discounts are from present lists now in effect. All prices carry standard extras.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, $57; chain rods, $65; screw, rivet and bolt rods and other rods of that character, $65. Prices on high carbon rods are irregular. They range from $70 to $80, depending on analysis.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16 in. x 4½ in. and heavier, per 100 lb., $3.90, in lots of 200 kegs of 200 lb. each, or more; track bolts, $4.80. Boat spikes, $5.25 per 100 lb., f.o.b. Pittsburgh.

Terne Plate

Effective May 21 prices on all sizes of terne plates are as follows: 5-lb. coating, 200 lb., $15 per package; 8-lb. coating, I. C., $15.30; 12-lb. coating, I. C., $17.00; 15-lb. coating, I. C., $18.60; 20-lb. coating, I. C., $19.60; 25-lb. coating, I. C., $20.60; 30-lb. coating, I. C., $21.75; 35-lb. coating, I. C., $22.75; 40-lb. coating, I. C., $24.00 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.90c. from mill. Refined iron bars, 3.50c in carload and larger lots, f.o.b. mill.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card, as announced Nov. 5 by the Government on steel pipe, those on iron pipe being the same as quoted for some time:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	44	17½	⅛ and ¼	23	+4
½	48	33½	⅜	24	+3
¾ to 3	51	37½	½	28	10
			¾ to 1½	33	17

Lap Weld

2	44	31½	1¼	18	3
2½ to 6	47	34½	1½	25	11
7 to 12	44	30½	2	26	12
13 and 14	34½	..	2½ to 6	28	15
15	32	..	7 to 12	25	12

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	40	22½	⅛, ¼ and ⅜	22	5
½	45	32½	½	27	14
¾ to 1½	49	36½	¾ to 1½	33	18
2 to 3	50	37½			

Lap Weld, extra strong, plain ends

2	42	30½	1⅛	19	4
2½ to 4	45	33½	1½	25	11
4½ to 6	44	32½	2	27	14
7 to 8	40	26½	2½ to 4	29	17
9 to 12	35	21½	4½ to 6	28	16
			7 to 8	20	8
			9 to 12	15	3

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent. Prices for less than carloads are four (4) points lower basing (higher price) than the above discounts on black and 5½ points on galvanized.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots, f.o.b. Pittsburgh, announced Nov. 13, as agreed upon by manufacturers and the Government:

Lap Welded Steel		*Charcoal Iron*	
3½ to 4½ in.	34	3½ to 4½ in.	12½
2½ to 3¼ in.	24	3 to 3½ in.	+ 5
2¼ in.	17½	2½ to 2¾ in.	+ 7½
1¾ to 2 in.	13	2 to 2¼ in.	+22½
		1¾ to 1⅞ in.	+35

Standard Commercial Seamless—Cold Drawn or Hot Rolled

Per Net Ton		Per Net Ton	
1 in.	$340	1¾ in.	$220
1¼ in.	280	2 to 2½ in.	190
1⅜ in.	270	2¾ to 3¾ in.	180
1½ in.	220	4 in.	200
		4½ to 5 in.	220

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiation.

Sheets

Makers' price for mill shipments on sheets of United States standard gage in carload and larger lots, are as follows:

Blue Annealed—Bessemer	Cents per lb.
No. 8 and heavier	4.20
Nos. 9 and 10	4.25
Nos. 11 and 12	4.30
Nos. 13 and 14	4.35
Nos. 15 and 16	4.45
Box Annealed, One Pass Cold Rolled—Bessemer	
Nos. 17 to 21	4.80
Nos. 22 and 24	4.85
Nos. 25 and 26	4.90
No. 27	4.95
No. 28	5.00
No. 29	5.10
No. 30	5.20
Galvanized Black Sheet Gage—Bessemer	
Nos. 10 and 11	5.25
Nos. 12 and 14	5.35
Nos. 15 and 16	5.50
Nos. 17 to 21	5.65
Nos. 22 and 24	5.80
Nos. 25 and 26	5.95
No. 27	6.10
No. 28	6.25
No. 29	6.50
No. 30	6.75
Tin-Mill Black Plate—Bessemer	
Nos. 15 and 16	4.80
Nos. 17 to 21	4.85
Nos. 22 to 24	4.90
Nos. 25 and 27	4.95
No. 28	5.00
No. 29	5.05
No. 30	5.05
Nos. 30½ and 31	5.10

Recovery of Potash from Blast Furnaces

Increased Output by Adding Salt to the Charge in British Practice—Effect of More Lime—Analyses of Dust

At the annual meeting of the Society of Chemical Industry, held at Bristol, England, on July 17, a paper bearing on this attractive topic was presented by K. A. Chance, of which an abstracted account has been published in the July 27 issue of the Chemical Trade Journal and Chemical Engineer.

In the autumn of 1914 the Halberg-Beth plant installed by Fraser & Chalmers, Ltd., for the purpose of cleaning their blast-furnace gases came into operation. A sample of the dust recovered from the gas was found to contain considerable quantities of potash and of cyanide. A preliminary examination of the dust led the British Cyanides Co., Ltd., to suggest a working arrangement by which a joint investigation should be made by them with the North Lincolnshire Iron Co., Ltd., into the possibilities of producing the dust and working it up into commercial products. This suggestion was accepted, but it was not until April, 1915, that deliveries of the recovered dust could be sent to the factory of the British Cyanides Co. at Oldbury.

The following is the analysis of a typical sample of dust derived from the Halberg-Beth plant at Scunthorpe in the early months of 1916, when the economizer plant was in operation:

Soluble in water: 5.58 per cent KCN, 14.60 per cent K_2CO_3, 22.23 per cent $KHCO_3$, trace of KSCN, 1.13 per cent K_2SO_4, 3.66 per cent $KHCO_2$, 10.90 per cent KCl, 3.97 per cent Na_2CO_3, 0.48 per cent $Fe(CN)_2$, 0.36 per cent Zn and Pb as sulphides.

Soluble in HCl: 11.68 per cent Fe_3O_4, 2.23 per cent ZnS, 10.39 per cent $CaCO_3$, 1.05 per cent MgO, also 8.91 per cent SiO_2, and 2.18 per cent carbon.

The total alkali and chloride are expressed in terms of K_2O,the actual proportion of soda to potash being found constant at about 10 to 90.

Effect of Adding More Lime

The analyses which were being made at Oldbury indicated that increased temperature was insufficient in itself to bring about a certain and definite rise in the production of potassium carbonate, K_2CO_3, but that there must be sufficient lime, CaO, in the charge to release the potash from the slag. The North Lincolnshire Iron Co., Ltd., therefore agreed to carry out a prolonged experiment on the result of increasing the proportion of lime in the charge, and at the same time increasing the temperature of the furnace. Daily fluctuations were considerable, but the proportion of potash in the form of carbonates, K_2CO_3, from both furnaces, when averaged out, showed a steady and continuous rise, until from a starting point of about 65 lb. of alkali per million cu. ft. of gas, it had before the end of the experiment reached and passed 100 lb. per million cu. ft., and was rising more steadily and regularly at the end of the experiment than in the earlier stages as experience led to the conditions of working being held under better control.

Potash Recovery and Clean Gas

The recovery of potash in a gas-cleaning plant at a blast furnace has one enormous advantage over all other native sources of supply in that the value of the main product of that plant—clean gas—is in itself sufficiently great to provide a handsome remuneration for the capital outlay involved in erecting it and the cost of its operation, so that the cost of recovering potash already in the gas in the form of dust is nil.

The author's second consideration was that the principal items of cost in volatilizing potash from an ore in which it is present in insoluble form—cost of raw material, labor and fuel—are, in the case of a blast furnace, already incurred and reckoned as items of cost in the manufacture of the main product, pig iron. The author finally held that, to the best of his knowledge, there is no bed of feldspar or similar ore in this country which can compare in magnitude or convenience of situation with the soluble potash deposits in Stassfurt and Alsace, while the cost of producing soluble potash from such insoluble ores must inevitably compare unfavorably with that of refining the soluble deposits above referred to.

Effect of Adding Salt to the Charge

The North Lincolnshire Iron Co., Ltd., consented to try the experiment of adding salt to one of their furnaces in sufficient quantity to volatilize the whole of the potash in the furnace. This was done in February, 1917, and the success was instantaneous, the chlorides in the gas rising from about 30 lb. per million cu. ft. to upwards of 200 lb. expressed as chloride of potassium, KCl, while the proportion of potash to soda in the total chlorides was not decreased, but remained at about 9 to 1, and the alkali in the gas was unaffected. The actual potash in the combined gas as alkalies and chlorides was therefore raised from about 60 lb. to upwards of 200 lb. per million cu. ft. of gas.

As regards the cost of this process of potash recovery, the author says it is strictly comparable to that of any heavy chemical, and therefore its cost will inevitably depend very largely upon the scale upon which that manufacture is conducted.

The salt process is at work in more than one blast-furnace works in England; cleaning plants are extracting the potash from the gas at those works in the form of dust; the first factory for treating the dust has been erected and is now producing potassium chloride, KCl, at the rate of some 50 tons per week. There are in addition cleaning plants in course of erection at other blast-furnace works, and the plant referred to, which is situated at Oldbury, is designed for a total output of from 400 to 500 tons of KCl per week. As supplies of raw material become available, it will be brought up to that scale of production.

In the discussion following the reading of this paper, the chairman of the meeting expressed doubts about the use of salt and whether it would not cut the top bricks. He thought calcium chloride would perhaps be found equally efficient.

The Cottrell Process

The author, replying to an allusion to the Cottrell process, said that a large amount of work was being done in America, but at the present time, so far as he had seen, the capital cost was too high. To get the fume out they had so to alter the size of the plant that the cost became prohibitive. The difficulty had been overcome in America by a double process, in the second of which they had only been able to keep the fume by trickling a stream of water over the plates. If they raised the density of the gas they lowered its dew-point, and carried out the vapor with it. That was the trouble with the Cottrell process, it was claimed. With regard to salt, NaCl, that was a problem that cost them more trouble than anything else. The actual putting-in of the salt did increase the amount of potash given off, but they had so much already that it saturated the bricks. It was shown at Middlesbrough some 28 to 30 years ago that potash did permeate the bricks.

Recently the Westinghouse Electric & Mfg. Co., East Pittsburgh, received contracts for the building of three 15,000-kw. generators for the gun and projectile plant being built by the Ordnance Department, United States Steel Corporation, at Neville Island, Pittsburgh.

NEW TRADE PUBLICATIONS

Foundry Equipment.—Peck Iron & Steel Works, Kalamazoo, Mich. Catalog S. Describes and illustrates an extensive line of steel foundry equipment, including slip jackets, snap-fast bands, upsets, reinforced core plates, bottom boards, strike plates, loading skips, ladle handles and tote pans.

Alternating - Current Motor - Operated Brakes.—Cutler-Hammer Mfg. Co., Milwaukee. Booklet A. Points out the operating features and applications of the brakes, emphasis being laid upon the fact that a special squirrel cage motor operates the brake and there is no hammer blow or shock when the brake is applied. Dimensions are given for a line of standard sizes ranging from 8 to 30 in. in diameter, and from 12 to 300 hp. in capacity. Views showing the brake applied to a large mine hoist motor and to a motor-driven elevator machine are included.

Triplex Power Pumps.—Worthington Pump & Machinery Corporation, 115 Broadway, New York. Bulletin P-702-25. Concerned with a line of single and double-acting vertical triplex power pumps. After a brief description of the general construction of the line, which is supplemented by views of the different parts, the various pumps which can be supplied are illustrated. As a general thing a pair of facing pages is given to each particular type with an illustration on one page and a brief description, and where necessary a condensed table of specifications on the other.

Insulating Brick.—Armstrong Cork & Insulation Co., Pittsburgh. Circular. Gives data on the losses due to the radiation of heat from improperly insulated furnaces and points out the advantages of employing insulating brick instead of fire or common brick for the walls, arches, bottoms and doors. A brief statement of the savings accomplished in the case of a number of annealing furnaces for malleable castings is presented, and an illustration of a battery of heat-treating furnaces insulated in this way is included.

Water Tube Boiler.—Uniflow Boiler Co., Inc., Philadelphia. Bulletin No. 18. Deals with a water tube boiler for which the advantage of positive and rapid circulation of water and an increased heating surface without increasing the size of the boiler are claimed. The construction of the boiler is gone into at some length, the text being supplemented by several illustrations.

Steel Ties.—International Safety Railway Tie Co., Belmar, N. J. Circular. Treats of a steel railroad tie with a wooden rail supporting member for which the advantages of safety, freedom from noise and permanence are claimed. Several drawings showing the details of the construction of the tie are included.

Boiler Arches.—Green Engineering Co., East Chicago, Ind. Booklet entitled "Capacity." Shows how the company's Sealflex boiler arch increases the quickness of ignition and the furnace efficiency of the boilers in which it is installed. The construction and method of installation of the arch are gone into in some detail and the text is supplemented by numerous illustrations.

Ball Bearings.—Transmission Ball Bearing Co., Inc., 32 Tenth Street, Buffalo. Bulletin No. 101. Contains a report of a test of the power consumed by this company's Chapman Ball Bearings as compared with those of the ordinary type. Details of the equipment tested and the way in which the tests were made are given and a number of illustrations and a set of curves showing the results obtained are included.

Vertical Steam Engines.—Clarage Fan Co., Kalamazoo, Mich. Catalog No. 6. Describes and illustrates a line of inclosed self-oiling vertical steam engines. A general description of the construction of the engines which are designed for pressures ranging from 40 to 250 lb. is first presented with numerous illustrations of the various parts. The applications for the different pressure types of engines are mentioned and illustrations and dimension diagrams and tables are presented.

Apparatus for Marking Steel.—Herman A. Holz, Metropolitan Tower, New York. Leaflet. Pertains to an electric method for marking metallurgical specimens, tools, dies, gages, etc., in which permanent marking is accomplished without setting up strains in the metal. A number of views of the apparatus in use are included.

Electric Grab Bucket Hoists.—Sprague Electric Works of General Electric Co., 527 West Thirty-fourth Street, New York. Bulletin No. 48938, superseding No. 902. Illustrates a line of electric grab bucket hoists for handling material in bulk. While the descriptive matter relates almost entirely to the use of the hoist for handling coal, it is shown how other bulk material such as iron pyrites, sand, ashes and cement can be handled with equal efficiency. The construction of the hoist is gone into at some length and the text is supplemented by illustrations of the various parts. Views of the hoist in use, and dimension diagrams and tables are included.

Electric Specialties.—Steel City Electric Co., 1207 Columbus Avenue, Pittsburgh. Catalog No. 33. Lists the complete line of electrical specialties manufactured by this company and supersedes the various bulletins previously issued, each of which related to some particular line. The specialties covered include bushings, outlets, outlet boxes, insulators, clamps, etc. All of these are illustrated and briefly described, and where necessary tables of the various sizes that can be furnished are given.

Storage Battery Tractors and Industrial Trucks.—Baker R & L Co., Cleveland. Four pamphlets. The first calls attention to a line of storage battery tractors of the four-wheel steer and the two and four wheel drive types for use in hauling loaded trailers in industrial plants. The construction of the tractors is gone into at some length and the text description is supplemented by numerous illustrations. The second pamphlet refers to a utility industrial truck, which can be supplied with either high or low platforms for many kinds of haulage work. In addition to carrying a load this truck can also be utilized for hauling trailers if necessary. The third pamphlet is devoted to the feature of simultaneous driving and steering of all wheels, which enables both the truck and the tractor to turn within their own lengths. The fourth pamphlet illustrates and describes briefly the plants in which the trucks are built and shows some typical installations.

Reamers and Special Tools.—Skelton Sales Co., Syracuse, N. Y. Catalog. Illustrates and describes a patent taper reamer. The special feature of the reamer is the grinding of two of the cutting edges on a taper to correspond with the hole to be reamed, while the other two are backed off sufficiently to take care of the thickness of the chip. The construction of the holder used in connection with the reamer is gone into at some length, and illustrations of both the reamer and the holder are presented. Mention is also made of a reamer for curved taper holes and a spot facing tool. Illustrations of these last two, together with tables of the different sizes of reamers that can be supplied and instructions for grinding are included.

Special Shovels.—Conneaut Shovel Co., Conneaut, Ohio. Booklet. Illustrations and descriptive matter explain the various operations entering into the manufacture of a line of shovels for handling concrete, ore, coal, ballast, excavated material, etc. In addition brief descriptions of the various shovels are presented.

Switchboard Instruments and Relays.—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Catalog No. 3-B. Lists an extensive line of switchboard instruments and relays of various types, including ammeters and wattmeters, and voltage, phase reversal, excess current and temperature relays. As far as possible, each particular type of apparatus is listed on but one page.

Threading Machinery.—Landis Machine Co., Inc., Waynesboro, Pa. Catalog No. 24. Size, 6 x 9 in.; pages, 78. Illustrations and descriptive matter explain the operation of a line of machines for threading bolts, pipe and nipples, pointing bolts, tapping nuts and cutting pipe. The chasers and the die heads used in the machines are first described and clearance diagrams and tables are presented. For the most part, a separate page is given to each machine with an illustration and condensed table of specifications. A complete code for ordering by telegraph, and a number of tables of useful information are included.

Grinding and Polishing Machines.—St. Louis Machine Tool Co., 932 Loughborough Avenue, St. Louis. Two circulars. The first describes and illustrates a line of grinding machines which are built with and without a self-contained countershaft. A general description of the machines is presented, supplemented by condensed specification tables and illustrations of the different sizes and styles that can be supplied. The other circular mentions a line of polishing machines and a special type of pull countershaft for driving them.

Electric Soldering Iron.—Cutler-Hammer Mfg. Co., Milwaukee. Folder No. 253. Calls attention to an electric soldering iron having a threaded heater core on which the tip is screwed. It can also be used for melting wax and marking various products, a special tip being used to give the desired design. Mention is also made of the automatic rack used in connection with these irons which was illustrated in THE IRON AGE, July 8, 1918.

PERSONAL

T. COLEMAN WARD

T. Coleman Ward, for some years vice-President of Hickman, Williams & Co., resident at Pittsburgh, and recently chosen president to succeed H. L. Williams, who was relieved from active service at his own request, was born in Louisville, Ky., receiving his common school education there, and later graduated from the Brooklyn Polytechnic Institute. His first business connection was with the Birmingham Rolling Mill Co. as shipping clerk, later going with the Sloss-Sheffield Steel & Iron Co. as yardmaster and assistant superintendent of furnaces. In 1903 he was connected with the Cincinnati office of Hickman, Williams & Co. as salesman for about three months, and was then transferred to the Pittsburgh office as resident manager. In 1913 he was made vice-president of Hickman, Williams & Co. at Pittsburgh, a position he continued to hold until made president. Mr. Ward will continue to make his headquarters in the Pittsburgh office in the Henry W. Oliver Building.

John D. Ryan, president Anaconda Copper Co., presented his resignation at a special meeting of the board of directors on Sept. 3. As Director of Aircraft Production, Mr. Ryan is now Assistant Secretary of War. C. F. Kelley, vice-president of the company, was elected as president to succeed Mr. Ryan.

Leonard W. Egan, special engineer with the Wellman-Seaver-Morgan Co., Cleveland, has severed his connection with that company and has become associated with the Electric Furnace Co., Alliance, Ohio, in a similar capacity. Previous to Mr. Egan's connection with the Wellman-Seaver-Morgan Co. he was for five years electrical engineer of the Pittsburgh Crucible Steel Co., Midland, Pa.

E. B. Meitzler, 23 Pierce Street, Kingston, Pa., who had charge of the sales of the Whitaker-Glessner Co, in the anthracite coal fields for the last few years, was obliged to resign Aug. 31 because the mill was unable to make deliveries.

Harry L. Williams has resigned as president of Hickman, Williams & Co., 322 South Michigan Avenue, Chicago, of which he was one of the founders, and will devote himself to his private interests. His retirement became effective Sept. 1, when he was succeeded as president by T. Coleman Ward, of Pittsburgh, former vice-president of the company. The firm has branches in several cities as furnace representatives and dealers in pig iron, coke, ferroalloys and other products. Among other interests it represents the Woodward Iron Co.

An employers' advisory committee of the Cleveland employment service to act under the auspices of the Government in handling labor problems has been appointed with a membership of 15. Among the members are Christian Girl, president Standard Parts Co., H. J. Boggis, vice-president Taylor & Boggis Foundry Co., H. P. Bole, vice-president Hydraulic Pressed Steel Co., Charles W. Hotchkiss, manager National Malleable Castings Co., E. R. Grasselli, vice-president Grasselli Chemical Co., George Bartol, president Otis Steel Co., Willard Fuller, works manager Upson Nut Co., H. S. Pickands, Pickands Mather & Co., A. W. Henn, president National Acme Co., and A. G. Smith, manager American Shipbuilding Co.

Reginald Banister, vice-president Woodward Iron Co., has been granted a year's leave of absence in order that he may take a rest after 25 years of unremitting work with the company, to return at the end of that period to his old position.

Frank H. Crockard, former general manager of the Tennessee Coal, Iron & R. R. Co., and later president of the Nova Scotia Steel & Coal Co., it is now officially announced, has been invited to join the Woodward company and is expected in Birmingham soon. The company is busy with its plans for the projected steel plant.

Munitions Director Crowell has selected Thomas Nelson Perkins and G. N. Dorr as assistant directors of munitions. Mr. Perkins was appointed counsel to the War Industries Board in October, 1917, and served for a time as member of the Priorities Commission, and later became assistant to E. R. Stettinius, in the War Department. Mr. Dorr was connected with the War Trade Board from August to December, 1917, and later served with Assistant Secretary Crowell in the War Department.

The Sharon Steel Hoop Co., announces the appointment of D. R. Fithian as superintendent of its Haselton works to succeed Charles B. Cushwa, resigned. The position of district manager, also held by Mr. Cushwa, will be abolished, and department heads in the district hereafter will report to G. W. Short, vice-president and general superintendent. Mr. Fithian for many years was connected with the Youngstown Iron & Steel Co., absorbed by the Sharon Steel Hoop.

C. H. Benson, for some years chief clerk of the operating department of the Republic Iron & Steel Co., Chicago, has left his position to enter military service. He is stationed at Camp Wadsworth, South Carolina.

The Standard Fuel Engineering Co., Detroit, maker of oil and gas furnaces, has opened a Chicago branch at 1911 Conway Building, in charge of J. J. Lynch, formerly of the Chicago Flexible Shaft Co. and the Ele-Kem Co., Chicago.

The Halcomb Steel Co., has opened an office which will be in charge of E. L. Reed, at room 702, Connecticut Mutual Life Insurance Building, 36 Pearl Street, Hartford, Conn.

Major W. A. Garrett, formerly of the Remington Arms Co., who has been in the thick of the recent fighting on the Somme River in France, addressed the Philadelphia Foundrymen's Association Wednesday evening, Sept. 4, at its first monthly meeting following the summer recess. Major Garrett told of his experiences in France.

H. F. Moore, of the Engineering Experiment station of the University of Illinois, is chairman of a committee appointed by the National Research Council, acting as the department of science and research of the Council of National Defense, to investigate the fatigue phenomena of metals. The committee is charged with developing a knowledge of the strength and durability of metals subjected to repeated stresses, such as ship structures, crank shafts of aircraft engines, and heavy ordnance. Much of the experimentation will be done in the laboratories of the University of Illinois at Urbana under the personal direction of Professor Moore.

T. H. Aldrich, director of zone 13 of the Resources Division of the War Industries Board, with headquarters at Birmingham, is spending the week in Tennessee organizing the plants there on a war basis. Mr. Aldrich said: "The large foundries and machine shops in the Birmingham district have all the war work they can do and more. A few of the smaller ones are not on essentials altogether, but are striving to be so engaged, because there is no iron for non-essential works."

Thomas Stratford of Philadelphia has been appointed general manager of the Nu-Ex Fire Appliance Co., Columbus, Ohio.

K. N. Sakiguchi, representing Kyosangumi & Co., Ltd., Kobe, manufacturers and importers, is registered at a San Francisco hotel. Mr. Sakiguchi is in this country to purchase steel bars and sheets for shipment to Japan. He expects to establish a branch office in San Francisco and will later go to New York, where another branch office will be established.

J. J. Trefz, Owensboro, Ky., who recently resigned

as superintendent of the Anglo-American Mill Co., manufacturer of milling machinery, has been made general manager of the Southern Foundry Co. of Owensboro.

John C. Haskins has resigned as chief engineer of the Louisville Bridge & Iron Works, bridge builder, Louisville, Ky., to accept a commission as first lieutenant of the Engineers' Reserve Corps, and went to Fort Benjamin Harrison, Indianapolis, where he reported for duty with the Twenty-second Engineers.

H. Jay Hayes has resigned as president of the Hayes Mfg. Co., Detroit, but retains the chairmanship of the board of directors. His successor as president is Hal H. Smith.

L. Clyde Smith has been appointed assistant general manager and treasurer of the Detroit Weatherproof Body Co., Pontiac, Mich. He recently disposed of his interests in the Detroit Welding & Mfg. Co., Detroit Electric Welder Co., and Burns Starter Co. He is at present procuring materials and shaping up production for extensive work on signal corps trucks.

Victor F. Dewey, former vice-president and general manager of the Detroit City Gas Co., Detroit, has been appointed general manager of the Detroit Steel Products Co.

Richard P. Tell, president and general manager National Brake & Electric Co., and president of the Milwaukee Metal Trades and Founders' Association, has been appointed chairman of the Wisconsin division, region 17, of the War Industries Board to fill the vacancy caused by the resignation of August H. Vogel, Milwaukee, who found it impossible to serve.

W. J. Garrity, who has been acting manager of the L. S. Starrett Co.'s New York office, sailed for France last week to become sales manager of the small tool department of Young, Corley & Dolan, Inc., at their Paris office, No. 7 Rue Meyerbeer. They also have an office at No. 115 Broadway, New York.

T. H. Harvey, formerly with the Pelton Steel Co., Milwaukee, has been appointed works manager of the Ohio Steel Foundry Co., Springfield, Ohio.

Fred W. Beach has been appointed to represent the Betz-Pierce Co., Cleveland, jobber in steel, in the Chicago territory. His office is at 911 People's Gas Building. He also acts as sales agent in the Chicago territory for the Mansfield Sheet & Tin Plate Co. and Mansfield Lock Washer Co., Mansfield, Ohio. Mr. Beach was formerly manager of La Salle Steel Corporation, Chicago, and prior to that general manager of sales of the Massillon Rolling Mill Co., Massillon, Ohio.

E. R. Wood, formerly Eastern representative of the High Speed Hammer Co., Rochester, N. Y., has associated himself with the sales department of Sherritt & Steer Co., Inc., Philadelphia.

F. Rodney Pleasonton has been made general works manager of the plants of the Savage Arms Corporation.

Henry E. Longwell, formerly of the Westinghouse Air Spring Co., New Haven, is now chief engineer for the Pierce, Butler & Pierce Mfg. Corporation, Eastwood, Onondaga Co., N. Y.

Frederick R. Banks has resigned as assistant equipment engineer, Remington Arms Union Metallic Cartridge Co., Inc., Bridgeport, Conn., to become chief engineer McNab & Harlin Mfg. Co., Paterson, N. J.

J. O. Persons, until recently works engineer Remington Arms Co., Bridgeport, Conn., has been appointed general manager of Bayles Shipyard, Port Jefferson, N. Y.

Ernest B. Talker, formerly master mechanic of the Federal Furnace plant, By-Product Coke Corporation, South Chicago, Ill., now holds a similar position with the Inland Steel Co., Indiana Harbor, Ind.

Everett W. Swartwout, formerly of the New York office of the Nordberg Mfg. Co., has been appointed manager of the Philadelphia office.

Olin H. Landreth, professor of civil engineering, Union College, Schenectady, N. Y., has been appointed to the Ordnance Department as mechanical engineer in the production bureau, stationed at Washington. The trustees of Union College have extended his leave of absence for another year.

Charles C. Trump, secretary and mechanical engineer, Humphrey Gas Pump Co., Syracuse, N. Y., has been appointed assistant administrative engineer, Federal Fuel Administration for New York State, of which Edward N. Trump is acting as administrative engineer.

The following have been nominated for members of the board of directors of the National Safety Council to be elected on Sept. 16 at St. Louis: George T. Fonda, superintendent, bureau of labor and safety, Bethlehem Steel Co., Bethlehem, Pa.; Van H. Manning, United States Bureau of Mines; A. H. Young, manager, industrial relations, International Harvester, Chicago; Robert J. Young, manager, department of safety and relief, Illinois Steel Co., Chicago; John J. Eagan, president American Cast Iron Pipe Co., Atlanta; J. W. Ensign, general manager, American Car & Foundry Co., Huntington, W. Va.; E. H. Fiesinger, safety engineer, Semet-Solvay Co., Syracuse, N. Y.; Dr. L. A. Shoudy, chief surgeon, Bethlehem Steel Co., Bethlehem; C. B. Auel, director of standards, processes and materials, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Malleable Works Organize for War Work

A War Service Committee of the malleable castings industry was appointed at a meeting of the malleable castings producers held at the Waldorf-Astoria Hotel, New York, Aug. 30, the meeting being called by the Chamber of Commerce of the United States at the request of the War Industries Board. About 100 were present, including members of the American Malleable Castings Association and foundrymen not members of the association. Frank J. Lanahan, president Fort Pitt Malleable Co., Pittsburgh, presided. A representative of the Chamber of Commerce explained that the object of the meeting was to organize the industry to work with the Government and that its connection with the matter ended when this committee was certified to the War Industries Board.

S. P. Bush, head of the Forgings and Castings Division of that board, and Major Bruce of the Ordnance Department addressed the meeting, the latter explaining that the department wanted foundrymen to turn out maximum production for the Government and eliminate non-essential work. Other speakers were Enrique Touceda and R. E. Belt, engineer and actuary of the association, respectively, the latter speaking on cost accounting.

A committee nominated by J. C. Bradley, Buffalo, was appointed to confer with all Government departments and agencies with reference to production or use of their facilities in making war material. This committee consists of Frank J. Lanahan, president Fort Pitt Malleable Iron Co., Pittsburgh; Henry F. Pope, president National Malleable Casting Co., Cleveland; John C. Haswell, president Dayton Malleable Iron Co., Dayton; Frederick L. Sivyer, president Northwestern Malleable Iron Co., Milwaukee, and John E. Walker, general manager Wilmington Malleable Iron Works, Wilmington, Del.

A new schedule of prices, covering malleable castings, which was prepared by the Malleable Association and in which was embodied a number of revisions, was presented and will be submitted to the American Iron and Steel Institute for consideration by the War Industries Board.

Failures of German Boiler Plates

Prof. O. Bauer of Berlin in a recent report on the failure of a boiler plate through the third seam of rivets from the edge, states that the failure was greatly assisted by the faulty caulking round the rivet heads. The chemical analysis and mechanical tests showed that the material was in every way satisfactory except around the rivet heads, where its texture was much altered and its strength greatly impaired by the cold working produced by the faulty method of caulking. This was clearly demonstrated by photomicrographs.

To Meet Larger Demand for War Steel

"Essential" Needs Now to Be Cut—Increasing Output of Rolled Brass—Doubling Locomotive Capacity

WASHINGTON, Sept. 3.—The War Industries Board is again at work on a revision of the war requirements of steel. The new figures are to be ready sometime this week. But already sufficient data are at hand to evidence that this revision will be a "revision upward" again.

Two months ago the War Industries Board had on hand a schedule of requirements of 20,000,000 tons for the current six months, against an output of 17,000,000 tons during the preceding six months. Chairman Baruch directed that the figures be trimmed to prevent the threatened shortage. But each new "trimming" merely raised the total. Week by week it climbed until two weeks ago it has passed 23,000,000 tons. Then Chairman Baruch ordered a new recasting of the figures with directions for heroic curtailments. But it has all been of no avail. The new recasting again brought in a lot of increases, each more urgent than the last. The demands from overseas seemed to grow overnight. Projectile steel, for instance, showed a startling upward tendency, and yet no one would dare to pare a single ton from General Pershing's demands, or from those of the Allied governments. The curtailment must be done at home.

Steel Hangs on Labor, Fuel and Cars

At the War Industries Board it was announced that the steel men of the country have promised to see that all the war orders are filled, "if" they can get the necessary labor, coal and transportation. Of these the transportation problem is the easiest. The coal shortage with its accompanying dearth of coke has made inroads into the steel output. To make matters worse, the mills report, according to the Steel Division of the War Industries Board, that the coal which they receive is 20 to 25 per cent poorer in quality than in peace times. This, as well as the coal shortage itself, is again traced back to insufficient labor.

As a result of all of these difficulties the War Industries Board is still sounding the refrain: "Cut, *Cut*, CUT!"

Where all the retrenchments are to be made is still part of the problem. Non-essentials have long since been tossed overboard and it is now the essential lines that are being trimmed. One after another the various industries are still being summoned to Washington, and then there is hearing after hearing to adjust the retrenchment orders where they will least interfere with an essential need.

Public as well as private business has come under this ban. The War Industries Board has ruled that building of post offices must stop—as a matter of fact it has stopped. Even more drastic is the rule that forbids the construction of new school buildings, except for unavoidable replacements.

"No non-war building enterprise can be given a priority rating except for replacement or emergency cases," announced Chairman Baruch in emphasizing the board's decision on school buildings and other public edifices. "The need for conservation to the point of sacrifice is so great that the board can consistently take no other course. It expects that one building will be made to do the work of two during the period of pressure."

The List of 64 Essential Industries

The War Industries Board has not yet published the list of "essential industries" promised last week. The list itself is completed. It contains 64 industries, covering about 10,000 plants. The delay in making it public, however, is due to the effort of the board to divide this list into four classes in order of preference. This task has proved most difficult. In great measure the difficulty lies in the fact that there is a varying order of preference within the individual industries.

But it is now promised that the list will be out some time this week and that it will govern in all questions of preference and priority in material, facilities, fuel, transportation, labor and finance.

The War Industries Board is also at work on a program to trim out the unessential features of various industries. It has begun with the shoe industry. That industry stands high on the "essential list," but in order to remain there Chairman Baruch has made it plain to the manufacturers that they must limit their output in a way that will get the largest possible production out of their allotments of material and labor. For several weeks he has been at work trying to convince them that it is possible to standardize shoes both as to styles and prices. At first the shoe manufacturers were recalcitrant. They knew their business better than the War Industries Board. But threats of even deeper curtailment induced them to yield. The manufacturers agreed to cut out as many styles of shoes as possible, particularly everything that can be designated as "fancy." The question of price fixing is still open, but Chairman Baruch seems confident that he will have his way and that safeguards will be found to prevent shoe profiteering.

When the shoe industry has been taken care of the board will undertake similar operations in other lines.

The Shortage in Brass

Because there is a marked shortage in the supply of brass for shells, cartridges, condenser tubes and other products essential to war, the brass manufacturers of the country were called to Washington last week. At a conference with Chairman Baruch they promised full co-operation with the Government officials to speed up the production of rolled brass. Plans suggested to this end were:

1. Each mill to take its full share of Government business.
2. Each mill to take work best suited to its equipment.
3. Cut off all non-essential uses of the products in which there is a shortage.
4. Determination by the manufacturers to get out the product in the face of obstacles—in other words, to work up to full capacity.

The meeting of the manufacturers to consider the Government's requirements for its own forces and to supply the needs of the Allies was called by Everett Morss, chief of the Brass Section of the War Industries Board. The industry was largely represented.

The chief difficulty in the way of maximum production, it developed, was shortage in labor. It was stated that with 9600 additional unskilled laborers the mills could increase their output 33⅓ per cent. Theoretically there is mill and machine capacity to meet demands, but full capacity is seldom attained at a mill. A number of plants are installing additional facilities, and the output of such plants will be increased shortly.

The cutting out of non-essential uses of the particular products needed in the war program was urged as a necessary move in the plan to give some relief immediately to a situation that is serious. This part of the program to prevent shortage in war material will be taken care of later by the War Industries Board, and the brass manufacturers pledged their best efforts to get the greatest production from their mills. Their gross production is now figured at about 2,910,000 lb. per day. An increase of a third would give a production of 3,388,000 lb. a day, while the demands, according to latest figures, are about 4,685,000 lb. per day.

To conserve brass the War Industries Board has taken steps to control the output of surface con-

densers for ship engines. The action followed a conference of the brass manufacturers with B. M. Baruch, chairman of the board, and representatives of the Navy and Emergency Fleet Corporation and a later conference of the board with the war service committee of the surface type condenser industry. About forty-five manufacturers are affected by the decision. They are being notified to enter into no new contracts with any purchaser, Government or civilian, except on a permit issued by the War Industries Board. To secure such a permit the proposed purchaser must demonstrate his need to the satisfaction of the board and this need will be considered in connection with the needs of the Government in the conduct of the war.

The manufacturers will be permitted to fill, where possible, existing orders with non-ferrous condenser tubes on contracts for shipment prior to Jan. 1, 1919. On contracts after Jan. 1, the manufacturers are urged to put steel tubes on condensers for land uses and are directed to send immediately estimates for steel required for this purpose. The Navy and the Emergency Fleet Corporation are exempt from these orders and regulations of the board as to condensers for ship use, but not as to condensers for land stations.

Several months ago the Government assumed control of the turbine engine industry because of the shortage in the supply and their essential need in the Navy and Emergency Fleet war programs. The non-ferrous condenser is an essential integral part of the turbine and the shortage in its production caused the Navy and the Emergnecy Fleet Corporation officials to appeal to the Government for stricter regulations concerning its production and distribution.

To Double Locomotive Output

To keep up with the war demands upon the railroads both in this country and France the Government has ordered a big increase in the production of locomotives. According to an announcement by the War Industries Board, a solution to the problem was assured at a meeting of representative locomotive builders with Chairman Baruch and other officials of the board, the Railroad Administration and the Government departments. Plans were worked out whereby the ouptput of the American locomotive manufacturing plants will be doubled, the increase being from more than 3000 on a pre-war basis to more than 6000. An equable distribution of the output to meet the military needs in France and the needs of the Railroad Administration for the steam roads of the United States has been provided by the chairman and this has met the approval of the Government officials concerned. Among those attending the meeting were Samuel Vauclain of the Baldwin Locomotive Works; President Fletcher of the American Locomotive Co.; General Manager Lassiter of the American Locomotive Co.; Colonels Tyler and Wright of the Army Engineers Corps; Assistant General Manager Hines, Director of Operations Gray and Director of Railroad Equipment J. R. Flannery of the Railroad Administration, and Henry Rea of the Committee on Munitions and Plants.

So far the War Industries Board has not issued a permit for the construction of a new plant at St. Louis by the American Locomotive Co., and it is understood that the locomotive building program agreed to at last week's meeting here in Washington does not include the erection of a St. Louis plant.

The United States Fuel Administration has announced that owing to the shortage of steel and other materials and because there is ample refining capacity in the mid-continent oil fields to take care of existing demands, it would not approve any priorities for materials to be used in the construction of new refineries. Priorities will be approved for materials to maintain existing facilities and for such additions as are necessary in the national interest. W. L. C.

Orders have been issued directing that non-essential industries in the Connellsville coke region be provided with electric power only at night time by the West Penn Power Co., the single power distributing agency operating in that region. The action aims to make possible a steady supply of power to essential industries.

Urged to Clean Up Scrap

WASHINGTON, Sept. 3—Acting on the suggestion of the American Iron and Steel Institute, the Central Advisory Purchasing Committee is again calling the attention of the various Regional Railroad Administrations to the necessity of making every possible effort to market scrap, iron and steel as rapidly as possible. The committee emphasizes the fact that owing to the large demand, new steel for war purposes can not be produced in sufficient quantity to meet requirements, so that scrap is an important item in connection with Government requirements.

H. R. Aishton, Regional Director for the Northwestern Region, has sent a special letter to the railroad officials in that district in which he says:

> Please make extraordinary efforts to clean up all scrap on the line, properly sort and market it at the earliest possible date. In some instances, a considerable amount of scrap is being obscured by the growth of vegetation along classification and material yards, and other places where track and car scrap accumulate. This should be looked after at once.
>
> Beginning Sept. 1, please render monthly report showing:
>
> 1. Total tons scrap on hand first of preceding month.
> 2. Total tons and value of scrap loaded on sales orders during previous month.
> 3. Total tons sold but not loaded.
> 4. Total tons on hand last day of preceding month not sold.
>
> If any delay in movement of scrap, explain reason in the report. In order to avoid delay to cars and extra haul by taking mixed scrap to dealers' yards, all scrap should be sorted, classified and sold in carload lots so that shipments may be made direct to consuming plants.
>
> Observation indicates a large amount of scrap and obsolete material can be obtained by carefully overhauling the material stored in bridge and building yards and superintendents' stocks on such roads as maintain stocks in these departments independent of the general storekeeper's stock.

Larger Coal and Coke Output

WASHINGTON, Sept. 3.—Bituminous coal production showed a slight recovery during the week ending Aug. 24, according to the reports of the Geological Survey. It is still, however, far below the amount required to meet the deficit. The total for the week was 12,603,000 net tons, including lignite and coal made into coke, an excess of 669,000 net tons over the previous week's output.

The Geological Survey reports that the shortage for the week of Aug. 17 was largely due to lack of cars. The bituminous mines during that week produced 77.7 per cent of their normal output. Of this deficit, car shortage contributed 12.4 per cent; labor shortage and strikes, 4.1 per cent; mine disability, 4.2 per cent; no market, 0.5 per cent; all other causes, 1.1 per cent.

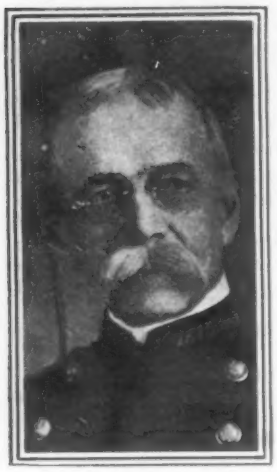
The production of beehive coke in the United States during the week ending Aug. 24 is estimated by the Survey at 592,000 net tons, against 575,000 tons in the preceding week. The operators in the Connellsville, Greensburg and Latrobe districts of Pennsylvania reported production of 402,807 tons and the operation of their plants at 74.6 per cent of capacity.

Operating conditions in the by-product coke industry improved slightly. The plants of the country produced 546,058 tons, operating at 89.6 per cent of capacity. The improvement is attributed to better labor conditions and repaired plants. Losses of time due to lack of by-product coal remain constant at 2.9 per cent. The placing of new ovens in operation by the Carnegie Steel Co. at Clairton, Pa., accounts for the increase in capacity in that State during the week.

The Birmingham Steel Corporation, Birmingham, Ala., has commenced the erection of its new steel fabricating works at North Avondale, near Birmingham, Ala. The initial unit to be constructed will cover an area of about five acres and is expected to be ready for operation in about five months. The plant will be used for the production of fabricated steel sections for the Mobile Shipbuilding Co., Mobile, Ala.

OBITUARY

JULIUS MERRILL FOOTE, president of the Strieby & Foote Co., New Jersey, manufacturer of forgings, whose death on Aug. 25 in Los Angeles was referred to briefly in THE IRON AGE on Aug. 29, was a resident of East Orange, N. J., and had gone to Los Angeles on account of ill health. He had been engaged in the manufacture of drop forgings for many years and had been very successful in his aim in business, which was quality rather than quantity. Born in 1843 in Pennsylvania, Mr. Foote was only 17 when he enlisted at the beginning of the Civil War, in the 176th New York Volunteers. After the war he was employed in the Morris Canal department of the Lehigh Valley Railroad for a number of years. In 1883 he joined, with his brother-in-law, Henry M. Strieby, in the forging company, and since the latter's death in 1893 he had been its head. Mr. Foote was prominent in G. A. R. circles and other patriotic and fraternal organizations.



J. M. Foote

THOMAS EDWARDS, for years manager of the furnace plant of the Tennessee Coal, Iron & Railroad Co. at Ensley, Ala., and for eight years manager of the furnace of the Central Coal & Iron Co. at Holt, Ala., died Aug. 27 at Sheffield after a brief illness.

THOMAS MASON, general superintendent of the New York Shipbuilding Co., who superintended the building of the cargo carrier Tuckahoe in the world's record time of 27 days, died Sept. 2 at his home in Camden, N. J. He had been ill nearly two months.

FRANK TOEPFER, former president of Wenzel Toepfer & Sons, iron works, Milwaukee, died suddenly of heart failure at his home in Milwaukee, Aug. 29, aged 68. Ill health compelled him to retire from active business several years ago.

MRS. R. ANNA CARY, the proprietor of Cary Spring Works, New York, died Tuesday, Aug. 20.

Compulsory health or social insurance was the subject of a round table discussion among employers of Milwaukee, conducted by the Milwaukee Asscciation of Commerce on Thursday, Aug. 29, in preparation for a hearing to be held Sept. 10 by the joint legislative committee of the Wisconsin Legislature which is investigating the subject. Dr. Edward H. Ochsner, Chicago, was the principal speaker. He pointed out that compulsory health insurance would cost $30,000,000 a year in Wisconsin, of which sum 40 per cent would be borne by the employers; 40 per cent by the employees, and 20 per cent by the State, according to the terms of the uniform bill proposed by the American Association for Labor Legislation.

Under the suggestion of the St. Louis Chamber of Commerce the proprietors of machine, die and tool making shops in the St. Louis industrial district are arranging for the formation of a corporate body through which their facilities may be made use of to the full capacity in war work. The purpose of the organization is to utilize small plants which in themselves are not large enough individually to handle war contracts and to do so through a corporate pooling of facilities and division of work. Jackson Johnson, regional industrial advisor, and M. E. Singleton, chief of ordnance production for this district, are aiding the movement.

Refining Copper and Zinc in Canada

Details of the progress being made in the development of new industries in Canada are given in a statement issued by the Imperial Munitions Board, Ottawa, Ont. The demand for supplies of zinc and copper required for munitions led to an investigation in 1915 to ascertain the feasibility of domestic refining copper and producing metallic zinc. This resulted in the establishment of the copper refining industry in Canada for the first time and a zinc plant was erected by the Consolidated Mining & Smelting Co. at Trail, B. C., at a cost of $2,500,000. The production of zinc was increased from a daily output of 1000 lb. to the present production of approximately 50 tons per day. The present annual capacity of zinc and copper plants is approximately: Metallic zinc, 18,000 tons; refined copper, 6000 tons.

A bill introduced in the Canadian House of Commons on May 20, 1918, proposes the payment of bounties on zinc produced from zinc ores mined in Canada. Under the provisions of this bill whenever it appears to the satisfaction of the Minister of Trade and Commerce that the standard price in London of zinc or spelter in cakes, blocks or pigs is less than £41 8s. 6d. ($201.59) per gross ton, the Governor in Council may authorize the payment of a bounty on zinc or spelter produced in Canada, at the time the price is as above stated, from zinc ores mined in Canada. The zinc or spelter must contain not more than 2 per cent of impurities to be entitled to the bounty. The bounty shall be equal to the difference between the standard price per ton and £41 8s. 6d., but shall in no case exceed 2c. per pound, and in no event shall any bounty be paid when the price received for such zinc and spelter by the producer is 9c. or more per pound. The total amount expended shall not exceed $400,000, and no bounty shall be payable on zinc or spelter produced after July 31, 1920.

First Rivetless Vessel Launched in England

The launching in July on the southern coast of England of the first steel vessel built without rivets in a shipyard operated by the Inland Waterways and Docks Section of the Royal Engineers is reported. It is considered at Lloyds that the production of this vessel may mark an epoch in the shipbuilding industry. The following details are available:

Instead of riveting and calking the plates, they are joined together in one process by electric welding. Though the process itself is not new, considerable developments have been made in the last 12 months, and this is the first time that a vessel has been produced entirely by the new method. Its general adoption would speed up production, more particularly in the assembly of bulkhead deck structures, fittings, and other interior work. It is computed from the results obtained on this experimental vessel and other Admiralty work that a saving of 20 per cent or possibly 25 per cent could be effected in both time and material.

While the first vessel just launched is rivetless, it is calculated that large vessels will only have about 2½ per cent of the originally intended number of rivets. In the vessel just launched the shell up to and including the bottom seam of the bilge plate, is continuously welded inside and out. The cross seams are similarly treated. The outside is continuously welded and the inside "tack" welded. Tack welding means welding a short section, say, 3 in., and then skipping another section of about twice as much. The frames, floors, deck brackets and nonwater-tight bulkheads are all tack welded; the water-tight bulkheads are continuously welded. In the case of the deck plates butt welding has been adopted. In the construction outlined it is considered that a good margin of safety has been allowed.

Effective, Aug. 31, the Submarine Boat Corporation, Port Newark, Newark, N. J., will commence the launching of two vessels a week until such later time as maximum production can be reached and three vessels launched each week. The company has been operating its bending and rolling shops on the piece-work system for some time past, and since the adoption of this method it is said that the total increase in production has been about 65 per cent.

CORRESPONDENCE

Handling Employees

To the Editor: Among those who are possessed of authority many have no clear idea of what should be the relations between themselves and their subordinates. They really do not know what attitude to adopt in dealing with these latter. Often they permit too much familiarity from them. They leave every one full liberty to act as he pleases, and with little or no supervision. In other cases they adopt quite the contrary attitude. Sometimes they even vary between the two extremes, not because of any systematic method they are following, but simply and solely because of their good or bad humor.

I strongly advise the employers that they should always talk clearly and simply with their subordinates, so as to be easily understood. They should avoid diplomatic phraseology, which always hides something. Otherwise the subordinates are likely to become suspicious, and not believe them even when they speak the truth.

Furthermore, I would like to say to the heads of factories that if they wish to have as little trouble as possible with their men, they should constantly try to show them, by acts instead of words, that they are frank, loyal and just, and are not merely trying to exploit them, and that in this case they will not only be respected, but I am firmly convinced will often be rewarded by a sincere devotion. In many cases the men will not be aroused against them even if they are absolutely rigid in their insistence on complete and punctual fulfillment of duty. In the beginning this attitude will be mistrusted, and for some time it may be regarded with suspicion, but this will pass and in time the management will be able to succeed in most of its desires.

Here is a typical example: The representatives of the unions had asked for some time that the workmen who were absent on the first of May (this being a socialist holiday) should not be punished, or even that the shops should be closed for the day. The manager never considered it worth while to accord this, so that every year at this period there was trouble.

I saw at once that this was a useless and expensive struggle for us, and that after all the men were not altogether wrong in wanting their holiday under the normal conditions prevailing. I therefore posted a notice authorizing the men, if they wished, to be absent on the first of May. As no great effort is necessary to persuade workmen not to work, I suppose that the militants had little difficulty in converting the indifferent men to their point of view, so that on the following first of May only twenty men out of five hundred came to work. The militants were greatly pleased to have had this occasion to show their force, and claimed it as a great victory. For my part, having made this concession, I took my revenge by being more severe in other matters, such as absences on Mondays, for example. Since the men no longer felt themselves backed by the union, they were obliged to give in.

As another example, I may cite the following case: For a long time the men had asked, without result, for a special dining room where those who could not go home for lunch might eat. They also asked for places for their bicycles, awnings on the windows, better heating during the winter and means for preventing drafts. For a very small sum all these demands could have been satisfied, but the management insisted on the most rigid economy. This case also caused a general dissatisfaction among the employees and the consequences were far more expensive than if we had granted their demands.

Since I consider the company morally responsible for the health of the men, and as, moreover, it was to the company's interest to watch over their health, and make it as comfortable as possible for them in the shop, I at once granted all these demands, which, moreover, cost the company very little. The conciliatory and humane attitude on this occasion won the company the friendship and gratitude of the men, and thus was prepared soil favorable to the growth of any other project.

FREDERIC MERON,
Consulting Engineer.

New York.

Another Tax Law Suggestion

To the Editor:—The article by Henry Hess published in your issue of Aug. 29 relating to a modification of the war tax system deals with a most timely subject. The writer made a suggestion a short time ago to Hon. Claude Kitchin, chairman of the Ways and Means Committee, to which he replied that the matter would have the careful consideration of the committee. The substance of the suggestion was that after the tax total is decided upon, a portion thereof, around 20 per cent, be made available in the form of an economy bond without interest, allowing the corporations to purchase such bonds in lieu of the tax, the bonds to be redeemed yearly after the war over a period of five years.

The object would be to stabilize business, to enable it immediately to force the campaign for the world's markets instead of emerging from the war in a financially crippled condition, which might result from excessive taxes. It is just as important to have working capital as any other form of equipment to compete properly with other nations, and some provision of this kind would protect the credit of industry at the end of the war.

The idea of "pay as you go" is unfair to the present generation, who are called on to fight the war, disorganize business and pay for it, while the war is being fought for the future generations as much as for the present and there is no reason why they should not pay a large portion of its cost.

The economy bonds, being non-interest-bearing, would have no market and therefore would be held for maturity, so the Government would have the use of the money, 20 per cent of which would be returnable to set business on a substantial basis. The results would bring many times the bond value in returns from a quickly established foreign trade.

L. J. MONAHAN,
President Universal Motor Co.

Oshkosh, Wis., Aug. 31, 1918.

Manganese Ore in Utah

WASHINGTON, Sept. 4.—Important studies of the manganese deposits of Utah have just been completed by the U. S. Geological Survey, which has found that manganiferous deposits are rather generally, though somewhat sparingly, distributed over Utah. Most of the deposits now known are in the Green River and Tintic districts, but reports indicate that many other deposits occur elsewhere, most of them at places rather remote from railroads. The available information suggests that a line drawn diagonally southwestward through the center of the State would separate areas that contain deposits of two distinctly different types. Practically all the known deposits west of this line are derived from quartz lodes of deep-seated origin. The ore is highly siliceous, and most of it needs some degree of concentration or benefication to make it marketable. Most of the deposits east of the line are of sedimentary origin, lie flat, very near the surface, or even upon it, and generally need only careful mining to yield a very high grade of ore.

Estimates based in part upon examinations made by Mr. Pardee of the Survey and in part on reports that are believed to be trustworthy indicate that there is in sight more than 500 tons of ore carrying more than 40 per cent manganese and between 8 and 12 per cent silica, and probably in reserve more than 3000 tons of ore of this grade. The reserve of ore carrying 25 to 40 per cent manganese and high silica probably will exceed 10,000 tons.

Machinery Markets and News of the Works

BUYING FOR GUN PLANTS

Orders for Very Large Tools Are Placed

Relining Shop in France and Neville Island and Midvale Now Active in Market

Aside from orders which are being placed for gun works and for airplane motor works, the machine-tool markets have been relatively quiet during the past week. The Ordnance Department has placed contracts for a number of very large tools for the new gun relining plant to be built in France, including monster planers and gun-boring lathes and several very large grinders, one of which will cost $100,000. A Chicago machine-tool builder has taken on a large quantity of these special lathes and planers and is also to make 168 shell-making machines for the Neville Island plant of the Ordnance Department, United States Steel Corporation. The Midvale Steel & Ordnance Co., Philadelphia, is also placing orders for tools for its new 16-in. howitzer plant at Nicetown.

Airplane motor manufacture is being expanded, as noted in this column last week. Large purchases of grinders for making crankshafts are pending.

The large list of the Baldwin Locomotive Works, Philadelphia, for its contemplated Chicago plant, will not be purchased until the Government approves final plans and cost estimates. The purchasing department of the Baldwin company has informed machine-tool salesmen that there is yet no definite assurance that the plant will be built. The equipment required will include about 80 traveling cranes.

The Bethlehem Shipbuilding Corporation, Bethlehem, Pa., continues to buy machine tools and other equipment for its new shipyard at Alameda, Cal. The Newport News Shipbuilding & Dry Dock Co., Newport News, Va., and the Barber Asphalt Paving Co., Philadelphia, have completed purchases of equipment for new boiler shops which they will build.

Automobile manufacturers who are not fully engaged in Government work are taking on war orders as rapidly as possible in order to keep their plants in operation after Jan. 1. The change in production from passenger cars to war work will necessitate the purchase of additional equipment. The Winton Motor Co., Cleveland, is inquiring for 25 machines and the Paige Motor Car Co., Detroit, has purchased a number of turret lathes and other tools.

Henry Ford & Son., Dearborn, Mich., are receiving bids on equipment for their new tractor plant at Hamilton, Ohio. About 400 machines will be required.

There is a fair amount of miscellaneous business, but mostly in small lots. With deliveries getting farther off and prices on some tools still advancing, manufacturers are doing without equipment which under other conditions they would not hesitate in buying.

New York

NEW YORK, Sept. 3.

The Ordnance Department is placing orders for the gun relining plant to be built in France. A New England company last week received an order for several large grinders, one of which will cost about $100,000. It was stated recently by the Ordnance Department that machine tools for the gun relining plant would represent a total cost of $12,000,000 to $15,000,000.

The American Radiator Co., Bayonne, N. J., has purchased another large grinder, costing about $25,000, and two smaller grinders for gun work.

The demand for grinders is a feature of the machine-tool market. Several good sized inquiries are now out. The Winchester Repeating Arms Co., New Haven, Conn., is inquiring for 25 to 30 and the H. H. Franklin Mfg. Co., Syracuse, N. Y., for 20. A large number will be required for grinding crankshafts for Liberty airplane engines. Three companies making airplane engines, which have lately bought tool equipment, have purchased a total of nearly 200 external grinding machines.

Westinghouse Church Kerr & Co., New York, are inquiring for a bending roll and several punches for a shop at Faimount, W. Va. A deal has been closed for 12 punching machines for export to shipbuilding companies in China which are building ships for the United States Shipping Board.

Crane inquiry is exceedingly light. It is said that the Baldwin Locomotive Works, Philadelphia, will require 80 cranes for its proposed plant in Chicago. No formal list has yet been issued. The Ordnance Department, United States Steel Corporation, which recently inquired for 176 cranes for the Neville Island gun and projectile plant, has revised its list, and will re-issue it in several sections, the first to appear calling for quotations on 48 10-ton cranes. Other revised lists will follow shortly. The New England Structural Co., Boston, has placed an order with the Shepard Electric Crane & Hoist Co. for two 5-ton cranes, 60 ft. span.

The Milwaukee Electric Crane & Mfg. Co. has taken an order from the Harry M. Hope Engineering Co., Boston, for a 15-ton, single-motor crane for the Eastern Connecticut Power Co., Norwich, Conn.

The Gefes Machine Co., 1401 Clinton Street, Hoboken, N. J., is considering the erection of a new one-story brick works, 100 x 200 ft., at Onderdonk and Flushing avenues, Ridgewood, L. I., to cost about $30,000. Preliminary plans have been prepared by Benjamin Driesler, architect, 153 Remsen Street, Brooklyn.

The Tool Machining Corporation, New York, has been incorporated with a capital of $250,000 to manufacture machinery, engines, etc. M. M. Capello, G. Norris and A. Jasper, 122 Maiden Lane, are the incorporators.

The Vapor Heat Attachment Mfg. Co., New York, has been incorporated with a capital of $100,000 to manufacture heating attachments. S. D. Johnson, M. Vanblarcom and M. H. Marks, 518 West 135th Street, are the incorporators.

The Navy Department, Washington, D. C., has awarded a contract to the Austin Co., Philadelphia, for a new repair shop at the Brooklyn Navy Yard to cost about $34,300. It is understood that the proposed new plant for the Ordnance Department at Long Island City, estimated to cost $400,000, will be held in abeyance for the next few weeks pending decision on final details.

The Indestructible Metal Products Co., New York, has been incorporated with a capital of $10,000 to manufacture metal goods. M. J. Reichman, H. J. David and M. Nachenson, 500 West 147th Street, are the incorporators.

The Estey Wire Works Co., 34 Cliff Street, New York, has increased its capital from $60,000 to $80,000.

The American Balsa Co., 50 East Forty-second Street, New York, has been incorporated with a capital of $1,000,000 to build vessels and operate repair works. The company is now completing the rebuilding of its one-story works, 135 x 165 ft., at 152nd Street and the Harlem River.

The Peelle Co., Stewart Avenue and Harrison Place, Brooklyn, manufacturer of elevator fire doors, etc., has increased its capital from $50,000 to $150,000.

The U-Need-It Dry Storage Battery Co., New York, has been incorporated with a capital of $75,000 to manufacture storage batteries. A. H. Jacobson, E. L. Creighton and J. J. Friedman, 966 Hoe Avenue, are the incorporators.

The Pomilio Brothers Corporation, New York, has been incorporated with a capital of $100,000 to manufacture airplanes and parts. F. E. Tilley, A. C. Sherwood and E. Pomilio, 501 Fifth Avenue, are the incorporators.

R. P. & C. H. McCully, 331 Van Buren Street, Brooklyn, manufacturers of brass goods, have been incorporated with capital of $50,000 to manufacture surgical instruments, founders' supplies and other specialties. R. P., C. H. and R. F. McCully are the incorporators.

The Darlington Mills, Inc., New York, has been incorporated with a capital of $75,000 to manufacture machinery and machine parts, etc. H. Leibow, H. Schultz and M. Auerbach, 1224 Forty-fourth Street, Brooklyn, are the incorporators.

The Lileter Syringe Corporation, New York, has been incorporated with a capital of $50,000 to manufacture surgical instruments. H. Cohen, C. Marks and H. MacCormick, 57 West 130th Street, are the incorporators.

The Englander Spring Bed Co., 88 Thirty-fifth Street, Brooklyn, manufacturer of metal beds and springs, has purchased an entire block bounded by Johnson, Stuart and Varick avenues, Long Island City, improved in part with a factory building. The company plans the construction of an addition to the present structure, to provide a manufacturing area of about 150,000 sq. ft.

The International Vehicle Supervision Corporation, New York, has been incorporated with a capital of $100,000 to manufacture attachments and parts for automobiles. C. Vox, J. A. and J. J. Howe, 509 West 135th Street, are the incorporators.

Paul S. Smith, S. B. Howard and Arthur W. Britton, 28 Nassau Street, New York, have incorporated in Delaware the Fulton Truck Co. of Wilmington, with capital of $75,000; the Fulton Truck Co. of Illinois, and Pittsburgh Fulton Truck Co., Pittsburgh, Pa., each with like capital, to manufacture motor trucks.

The Rohamer Tire & Rubber Co. of Akron, Woodside, L. I., has been incorporated with a capital of $40,000 to manufacture tires and other rubber goods. G. E. Rohamer, A. D. Pallot and B. F. Timme, 593 Riverside Drive, New York, are the incorporators.

The Fort Mifflin Shipbuilding Corporation, Widener Building, Philadelphia, has had plans prepared for the construction of a new shipbuilding works near Paulsboro, N. J., to cost about $1,000,000, including two one-story shops, 60 x 580 ft. and 120 x 180 ft., for light and heavy plate work; one-story forge and blacksmith works, 75 x 350 ft.; one-story shop, 60 x 175 ft., for copper working; two-story joiner shop, 80 x 400 ft.; two-story paint works, 60 x 200 ft., and one-story shop, 100 x 530 ft., for general construction purposes. The company was incorporated the latter part of last year with capital of $10,000,000. L. A. Gilliam is general manager. Leonard B. Harris, Flushing, L. I., consulting engineer for the company, has prepared plans and specifications.

The Pan-American Rubber Co., Paterson, N. J., has been incorporated with a capital of $20,000 to manufacture rubber goods. Frank Christman, A. F. Boettscher and Fred Coellin are the incorporators.

The Government has taken title under lease to about 1700 acres in the vicinity of Stewartsville, N. J., for aircraft works, to be known as the Phillipsburg Naval Reserve and Aerial Station. The initial structures will consist of training masters, shop for repair work, and miscellaneous buildings, each about 200 x 500 ft. Plans and specifications have also been prepared for the construction of new naval air stations in the vicinity of Cape May.

The Protection Safety Appliance Co., 50 Columbia Street, Newark, has been incorporated with a capital of $50,000. Duncan T. McLaren, Edward H. Vost and Frank Nole, Newark, are the incorporators.

The Newark Wire Cloth Co., 224 Verona Avenue, Newark, N. J., will soon commence the erection of a one-story addition, 22 x 80 ft., at 846-52 Mount Prospect Avenue. John C. Campbell is president.

A. P. Munning & Co., 202 Emmet Street, Newark, N. J., have been incorporated with a capital of $500,000 to manufacture electrical machinery and equipment. Julian A. Gregory, 44 Carleton Street, East Orange, and John G. Daniel, 40 Clinton Street, Brooklyn, are the principal incorporators.

Following the recent purchase of a property on Avenues A and B, Newark, the Klaxon Co., of the United Motors Corporation, 194 Wright Street, Newark, manufacturer of automobile horns, etc., is having plans prepared for the erection of an extension 200 x 700 ft.

The Gill Ring Sales Co., 284 Halsey Street, Newark, has been organized to manufacture ball bearings, etc. Joseph M. Christman, 176 Nagle Avenue, New York, heads the company.

The Essex Foundry Co., Murray Street, Newark, will build a one-story addition and make other improvements and alterations to cost about $41,000.

The Eagle Tool & Machine Co., Newark, has been incorporated with a capital of $25,000. Charles Kolarsick, Balzar Holzel and George Beck, Newark, are the incorporators.

The Flockhart Foundry Co., Newark, has been incorporated with a capital of $1,200,000 to manufacture iron and steel castings. It will take over the plant of Maher & Flockhart, 76 Polk Street, which has been operated by James Flockhart, principal incorporator, since the death of Mr. Maher. The new organization also proposes to manufacture aluminum, bronze and other castings. Robert E. Moore, John Campbell and John Montieth are other incorporators.

The M. & R. Tool Co., 59 Mechanic Street, Newark, has been organized to manufacture tools. Frank W. Reilly, 623 Belmont Avenue, and Walter J. McInnis, 202 Elwood Avenue, East Orange, head the company.

The new plant of the Liberty Machine Tool & Die Co., 692 South Eleventh Street, Newark, located on Grove Street, Irvington, will be used, it is understood, on Government work exclusively; a machine shop, 80 x 100 ft., to cost about $28,000, is now in course of construction. The company was formerly known as the Newark Machine & Engineering Co. Albert W. Wenzel is president.

The National Machine & Tool Co., Newark, has been incorporated with a capital of $10,000 to manufacture tools and machinery. Harry Kantron, S. Silverman and Meyer Strell, Newark, are the incorporators.

Buffalo

BUFFALO, Sept. 2.

The John Henrich Co., 322 William Street, Buffalo, operating a stove repair works and hardware factory, has increased its capital from $30,000 to $50,000.

The New York Central Railroad, Grand Central Terminal, New York, will make extensions and improvements in its engine houses and shops at the Dewitt yards, Belle Isle and Syracuse Junction, including additions to the engine houses at the first two locations, and the construction of a large engine terminal with shop for repair work, etc., at Syracuse Junction. W. J. Fripp is general manager.

R. Paul Beyreuther, Syracuse, N. Y., formerly connected with the Paul Welding & Machine Co., has organized the Independent Welding Works and will operate a plant at 510 E. Water Street, for cutting, welding and other work.

The Robert Hoes Co., Malden Bridge, N. Y., has been incorporated with a capital of $10,000 to manufacture pumps and pumping machinery. A. H. Whitman, G. M. and Robert Hoes are the incorporators.

The North Country Shipbuilding Corporation, Ogdensburg, N. Y., has been incorporated with a capital of $150,000 to construct vessels. E. J. Burns, C. S. Bollars and J. C. Tulloch are the incorporators.

The Clark Novelty Co., Rochester, N. Y., has changed its name to the Clark, Cadle, Harmon Corporation.

The J. P. Devine Co., Buffalo, manufacturer of vacuum drying and impregnating apparatus, has taken out a permit for a storage and factory building at its plant, Clinton Street and the Erie Railroad.

The American Locomotive Co., Dunkirk, N. Y., has let a contract for an addition to its boiler shop to cost $150,000.

New England

BOSTON, Sept. 2.

The subject of absorbing interest at the present time is the attitude of labor and of employers toward recent awards of the National War Labor Board, as related elsewhere in this issue of the IRON AGE. It has become evident that the decisions of an advisory board are rarely pleasing to both parties to a controversy and that the handing down of an award does not mean industrial peace.

The effect of placing restrictions on New England in the way of expansion of capital or plants is being made manifest, and the tribulations of manufacturers in regard to the supply of raw material and labor and the transportation of raw and finished products has also cut down industrial activity in New England states.

There has not been so much placing of big business the past week, but the volume of orders received has indicated that the improvement in the machine equipment in a great majority of the plants is continuing and that there is some expansion going on in a small way.

The Leland-Gifford Co., Worcester, Mass., has awarded

a contract to the E. J. Cross Co. for an addition, 60 x 62 ft., three stories. This addition is for the expansion of its regular line of work, including the machining of crankshafts for Liberty motors and motor vehicles, and there is no basis for the rumor that it is to engage in the manufacture of airplane motors complete.

The Acme Tool & Machine Co., Derby, Conn., has increased its capital stock $9,500, making its outstanding stock $50,000.

The Hartford Special Machine Co., Hartford, Conn., has had plans drawn for two additions, 25 x 50 ft., one story, and for a storage shed, 30 x 100 ft., one story.

The Eastern Machine Screw Co., New Haven, Conn., has awarded a contract to C. W. Murdock for an additional story to a building, 81 x 80 x 55 ft.

The Chase Metal Works, Waterbury, Conn., will build an addition, 40 x 320 ft., one story.

The North & Judd Mfg. Co., New Britain, Conn., has secured a permit to erect a storage building, 40 x 100 ft., one story.

The American Brass Co., Ansonia, Conn., has begun the construction of an addition, 22 x 75 ft., one story.

The Liberty Screw Co., Worcester, Mass., manufacturer of screw machine products, has moved into its new factory at 383 Shrewsbury Street.

Philadelphia

PHILADELPHIA, Sept. 2.

Large orders for machine tools have been placed in the Philadelphia market within the past two weeks, with more pending. The largest list before the dealers is that of the Baldwin Locomotive Works, Philadelphia, which, as mentioned in these columns last week, consists of more than 1000 tools. The purchasing department of the Baldwin company advised machine-tool dealers that there was no definite assurance that the list would be bought, but that quotations were desired for the purpose of informing the Government how much it would cost to build the proposed locomotive works in Chicago. It is believed likely, however, that the Government will approve the project, in which event the equipment will be purchased soon, as deliveries are desired by Jan. 1.

The Bethlehem Shipbuilding Corporation, Bethlehem, Pa., has issued several additional lists in the past week of equipment required for shops at the new shipyard at Alameda, Cal. These lists cover equipment for a machine shop, tool room, forge and blacksmith shop and plate and angle shop. The Sun Shipbuilding Co., Chester, Pa., is buying tools for a repair shop.

The Newport News Shipbuilding & Dry Dock Co., Newport News, Va., and the Barber Asphalt Paving Co., Philadelphia, have closed for good sized lists of equipment for new boiler shops which they will build for the Emergency Fleet Corporation.

The Midvale Steel & Ordnance Co. is placing orders for machine tools for its new howitzer plant to be built at Nicetown.

The United Electric Construction Co., 1727 Sansom Street, Philadelphia, has acquired adjoining property at 1729-31 Sansom Street, consisting of a three-story brick shop and four-story connecting structure, valued at over $40,000.

The Otis Elevator Co., Sixteenth and Sansom streets, Philadelphia, is said to be planning for the construction of a two-story addition on Shackamaxon Street, 80 x 155 ft., to cost $50,000.

The Tioga Steel & Iron Co., Fifty-second Street and Grays Avenue, Philadelphia, has filed plans for the construction of a one-story forge shop at its gun works, 56 x 85 ft.

The Henry A. Hitner's Sons Co., Gaul and Hazzard streets, Philadelphia, manufacturer of hardware and specialties, has filed plans for a one-story extension, 50 x 400 ft., at Allen and Buckius streets, to cost about $10,000.

The Department of Public Works, Philadelphia, will expend about $50,000 in remodeling its boiler plant and coal conveying system at Lardners Point. George E. Dateman is director.

The David Lupton Sons Co., Allegheny Avenue and Tulip Street, Philadelphia, manufacturer of steel sash, etc., has broken ground for the construction of a one-story addition, 140 x 300 ft., with extension 50 x 200 ft. A three-story office building to cost $60,000 will also be erected.

The Curtiss Flying Machine Co., Atlantic City, N. J., a subsidiary of the Curtiss Aeroplane & Motor Corporation, Elmwood Ave., Buffalo, N. Y., is said to be planning for the erection of a new plant on the inlet for the manufacture of parts and equipment.

The Delaware Shipbuilding & Repair Co., 308 Chestnut Street, Philadelphia, has acquired about 12 acres at Beach and Erie streets, Camden, N. J., adjoining the shipyards of Quigley & Dorp, will be used for the construction of a shipyard and repair works. It is understood that the plant will be equipped for the production of ocean-going barges of about 2500 tons capacity. John J. Turney is president.

The Public Service Railway Co., Camden, N. J., is taking bids for the construction of a one-story car repair shop, 70 x 130 ft., on Newton Avenue.

The Titian Metal Co., Bellefonte, Pa., is planning for the erection of a one-story addition to its works, 60 x 100 ft.

The West Branch Steel Co., Williamsport, Pa., has increased its capital stock from $400,000 to $500,000.

The Pennsylvania Railroad, Broad Street Station, Philadelphia, has commenced the tearing down of buildings on property recently acquired at Marietta, Pa., for new shops and plans for the immediate construction of a new machine shop, engine house, car shop and other works.

Baltimore

BALTIMORE, Sept. 2.

The South Baltimore Car & Foundry Co., Curtis Bay, Md., recently acquired property near the present plant and it is understood a plant for the fabrication of steel plates for vessels will be constructed, including one large shop and several smaller buildings.

The Atlantic Iron Works, Norfolk, Va., will build a two-story addition, 52 x 122 ft.

A one-story power plant, 40 x 100 ft., to cost $25,000, will be constructed by the Mount Vernon-Woodberry Cotton Mill, Woodberry, Md.

The Consolidated Gas, Electric Light & Power Co., Baltimore, will build a reinforced-concrete addition to its power plant at Westport, Md., to cost about $300,000.

The Pratt Engineering & Machine Co., Atlanta, Ga., is planning to double the capacity of its foundry.

The Bureau of Yards and Docks, Washington, D. C., has taken bids for the erection of a new one-story steel and concrete addition, about 330 x 600 ft., for the Navy Department at Norfolk, Va., to cost about $425,000.

The Black Locust Treenail Co., Asheville, N. C., recently incorporated with a capital of $20,000, is planning for the establishment of a plant for the production of treenails for shipbuilding work. R. P. Harris heads the company.

Pittsburgh

PITTSBURGH, Sept. 3.

The local machinery market was quiet last month. Most of the inquiries now coming out are for the Neville Island plant of the Ordnance Department, United States Steel Corporation, but orders are being placed slowly. The crane specifications have been revised once and are again undergoing revision. Some large orders for shell lathes have been placed with the Amalgamated Machinery Co., Chicago, but details have not been given out. It is stated that an order for 10 special gun-boring lathes has been placed with the Motch & Merryweather Machinery Co., Cleveland, for the Neville Island plant, the first to be delivered in about six months. The demand for tools from the railroads is spasmodic and purchases are not heavy. The American Steel & Wire Co. is to make shell steel at its Donora works and will likely need some new equipment. The Carbon Steel Co. is building new mills to turn out Government work and has placed an order for one 10-ton crane with Manning, Maxwell & Moore, and will purchase more in the near future. Large tool makers are filled up for several months, but some crane builders can take orders for fairly prompt delivery.

The Pittsburgh Mining Machinery Co., Pittsburgh, is preparing plans for building a new machine shop.

The McLanahan Stone Co. is to build a new foundry and machine shop at Gaysport, Pa. Some new equipment will be needed.

The Greenville Mfg. Co. will build a new plant at Greenville, Pa., for the manufacture of special machinery.

The Carbon Limestone Co. is planning to make some additions to its plant at Hillsville, Pa.

The Sharon Water Works Co., Sharon, Pa., will extend its filtration plant. It contemplates installing a 5,000,000 gal. pump.

The Vallemont Motor Truck Co., Pittsburgh, has been incorporated with a capital of $30,000 to manufacture motor trucks. A. C. Overholt, Scottdale, Pa., is interested.

The Moltrup Steel Products Co., Beaver Falls, Pa., recently bought the plant of the Nicholson File Co., that city.

which it will remodel for the manufacture of cold drawn steel bars and also cold drawn, milled and ground specialties. The property consists of nearly three acres, and has brick and frame buildings with nearly 42,000 sq. ft. of floor space. Practically all the machinery is special and will be built by the company.

The West Penn Power Co., Pittsburgh, has closed negotiations with the Government for the erection of a new electric power plant near Freeport, Pa., in the Allegheny Valley coal district, to cost about $5,000,000, of which amount the Government will advance $2,000,000 and the company the remainder. The plant will have a capacity of 40,000 kw. with installation of two 20,000 kw. turbo generators.

The Triangle Tool Co., Erie, Pa., has increased its capital from $30,000 to $100,000.

The Tile Water Pipe Co., Bradford, Pa., is planning for the construction of a three-story machine shop addition on South Avenue, 50 x 105 ft., to cost $15,000.

Chicago

CHICAGO, Sept. 2.

The Amalgamated Machinery Corporation, 72 West Adams Street, Chicago, whose four concrete metal-planing machines have been accorded wide attention, is to construct a similar machine with a bed 500 ft. in length for planing the beds of monster gun-boring lathes having a swing of 102 in. and 185 to 200 ft. in length. Forty of these big boring machines are to be made for reboring guns at the American base in France. The contract is with the United States Government. The Amalgamated company has an immense amount of work on hand, including 168 shell-making machines for the Neville Island ordnance plant. It is erecting an addition, 75 by 300 ft., to one of its shops, and also building a pattern storage building. When the addition is completed, work will be started on the gigantic planing machine. Purchase of additional land was noted a short time ago. Its plant is in Racine Avenue, between Thirty-seventh and Thirty-ninth streets.

The Dependable Truck & Tractor Co., Galesburg, Ill., is having plans drawn for a new factory, 100 x 300 ft.

The Noble Motor Truck Co., South Whitley, Ind., will erect a factory, 100 x 192 ft.

Chicago machinery dealers have received a 12-page pamphlet containing the list of tools and equipment which the Baldwin Locomotive Works will require for its proposed plant at East Chicago. The inquiry requests that prices and delivery be quoted, stating that the machines are for its "contemplated" Chicago plant. Approximately 700 tools appear on the list, broadly classified as follows:

67 boring mills.
41 punches and shears.
95 planing machines.
32 shaping machines.
85 miscellaneous tools.
87 grinding machines.
15 presses, most of them large.
13 riveters.
13 saws.
16 tapping machines.
145 lathes.
31 slotters.
42 milling machines.
142 drill presses.

The machines wanted are of the usual sizes and types used in locomotive works.

The demand for both new and second-hand tools has continued very active. A local munitions maker closed in the week for 60 lathes and 20 30-in. drill presses, and another placed an order for 36 drill presses.

The Stewart Mfg. Corporation, Chicago, maker of die castings, in consequence of securing a large war order, is planning to issue $500,000 in first mortgage real estate 6 per cent serial bonds maturing within five years.

The Delaware Marine Engineering & Construction Co., Chicago, has been incorporated in Delaware with capital of $10,000 to construct and repair ships. Andrew Frank, Charles G. Goetz and H. J. Baker, Chicago, are the incorporators.

The new machine shop and engine house to be constructed by the Illinois Central Railroad, Chicago, at Benton, Ill., is estimated to cost about $80,000. Plans are being prepared by F. R. Judd, engineer. Contract has been awarded to T. S. Leade & Co., 608 South Dearborn Street, for the erection of a new engine terminal at Hawthorne, Ill., to cost $150,000, including engine house, machine shop, etc.

The National Meter Co., 1227 South Wabash Avenue, Chicago, has purchased property in South Park Avenue, near Cottage Grove Avenue, 50 x 180 ft., improved with a three-story brick building into which it will move in a few days.

Contracts have been awarded for a three-story top addition, 93 x 200 ft., to the factory of Bauer & Black, chemists, 2510 South Federal Street, Chicago. The company is erecting a seven-story factory at Twenty-fifth and Dearborn streets.

The Dunbar Drop Forge Co., 5216 West Kinzie Street, Chicago, has been granted a permit for the construction of a one-story storage building and alterations to its plant to cost $6,000.

The large shell plant of the Symington-Chicago Corporation is nearing completion. There are 1200 to 1500 men now employed in the construction of the plant, the original estimate for which was $6,500,000, including machinery. Probably 10,000 men will be employed when the plant is running at capacity.

Milwaukee

MILWAUKEE, Sept. 2.

New business consists principally of single tools and in the case of milling machines, embraces nearly all types. The demand from the East is more limited, consisting mostly for tools for replacement or additions. In the Middle West conversion to war work has extended to other than metal-working industries, and many factories previously devoted to other classes of work are changing over to machine shops. This is an exception rather than a rule, however.

The enactment of the 18 to 45 selective service act, already largely discounted, is not causing much concern among employers in the metal working industry, it being assumed that no sacrifice of industrial man-power will be made to recruit the enlarged military forces.

The labor situation, which for a short time threatened to develop serious outbreaks, has quieted, and while the acute shortage still exists, the turnover has subsided to a very considerable extent.

A new machine-tool industry, the Davis-Thompson Co., is being established in Milwaukee by Frank M. Davis and John T. Thompson, formerly the principal executives of the Davis Mfg. Co., Fifty-seventh Avenue and Mitchell Street, who have perfected a new type of milling machine which will be manufactured under the name of the Davis-Thompson continuous miller. Experimental work has been completed and regular production will be undertaken immediately. As soon as practicable the company will erect a plant in West Allis, on a site already acquired. For the present, however, the milling machine will be manufactured in the plant of the Smith Engineering Works, Milwaukee, under contract. The Smith works will be enlarged by the erection of a one and two-story addition, 65 x 100 ft., of brick and steel, to accommodate this and other work. Temporary offices have been established by the Davis-Thompson Co. at Thirty-second and Locust streets in connection with the Smith Engineering Works.

The Giddings & Lewis Mfg. Co., Fond du Lac, Wis., manufacturer of machine-tools, is making a number of improvements in its plant, including the erection of a utility building, 50 x 75 ft.

The Northwest Engineering Works, Green Bay, Wis., which recently acquired the ship construction and repair plant of the Hartman-Greiling Co., will invest about $35,000 in the erection of an addition to its fabricating shop, the contract for which has been awarded to L. H. Hanson, Green Bay.

The Stegeman Motor Car Co., 606 Linus Street, Milwaukee, manufacturer of 6-cylinder, worm-drive motor trucks, has changed its corporate style to the Parker Motor Truck Co. and inceased its capital stock from $200,000 to $350,000. The business is being enlarged to include the manufacture of tractors and trailers. The Stegeman interests retired some time ago. Frank H. Parker is president and general manager, having previously been a member of the board of directors.

The Falls Motors Corporation, Sheboygan Falls, Wis., has awarded a contract to the Immel Construction Co., Fond du Lac, Wis., for the erection of a one-story machine-shop addition, 60 x 176 ft., of brick, steel and reinforced concrete, which with equipment will cost about $50,000. The company is devoting practically its entire capacity to the production of gas power units for vehicles for the Government.

The Pioneer Mfg. Co., Milwaukee, has increased its capital stock from $10,000 to $25,000, to cover enlargement of its machine-shop facilities at 6703 Greenfield avenue, West Allis.

Detroit

DETROIT, Sept. 2.

Among Michigan concerns to receive Government contracts are the following: Champion Ignition Co., Flint, 16,000 spark plugs; Michigan Copper & Brass Co., Detroit, brass disks; Briscoe Motor Corporation Jackson, rifle grenades; Michigan Motor Specialties Co., Detroit, cartridge clips; Eclipse Interchangeable Counterbore Co., Detroit, automobile repair shop equipment; Lufkin Rule Co., Saginaw, rules, metallic tapes, chain tape, spring-tempered rules, caliper rules; Studebaker Corporation, Detroit and South Bend, trucks, artillery wheel fastenings and hubs; Mailometer Co., Detroit, master inspection gages; Michigan Bolt & Nut Co., Detroit, eyebolts; Bower Roller Bearing Co., Detroit, 4000 wheel bearings; Disco Electric Mfg. Co., Detroit, 1000 synchronizing generators; Maxwell Motor Co., Detroit, motor trucks; Industrial Works, Bay City, locomotive cranes; Pemberthy Injector Co., Detroit, automatic injectors; Burroughs Adding Machine Co., Detroit, adding machines; Blackmer Rotary Pump Co., Petoskey, pumps; American Logging Tool Co., Evart, hooks, bark spuds, handles, spike and hook points, etc.; H. D. Edwards & Co., Detroit, steel blocks; Detroit Twist Drill Co., Detroit, hand taper reamers; American Stamping Co., Battle Creek, grease cups; Advance Pump & Compressor Co., Battle Creek, steam pumps; Cadillac Motor Car Co., Detroit, spare parts; Denby Motor Truck Co., Detroit, trucks; Michigan Lubricator Co., Detroit, grease cups; Ford Motor Co., Detroit, spare parts for 5000 Liberty engines and cars.

The General Aluminum & Brass Mfg. Co., Detroit, has let contracts for the following new units to take care of Government contracts: A two-story aluminum foundry, 100 x 100 ft., with coke ovens; two brass foundries, one 40 x 100 ft., to be equipped with sand bins and simplex and coke furnaces; the other, 60 x 180 ft., and a machine shop, 60 x 140 ft., three stories.

The Motors Metal Mfg. Co., Detroit, will erect two one-story additions, 60 x 200 ft. and 50 x 60 ft., respectively.

The Dort Motor Car Co., Flint, Mich., has increased its capital stock from $1,500,000 to $2,000,000.

Leslie R. Action, president, and other officials of the Power Truck & Tractor Co., Detroit, recently organized, have removed their temporary offices from 716 Book Building to the new plant at Bates and Livernois Streets. Preparations are progressing for beginning production.

With an additional order for 3000 tractors from Illinois, the production of the plant of Ford & Son, Dearborn, Mich., is sold out for the next 12 months, orders totaling 50,000 trucks. Instead of supply branches the company will establish manufacturing plants, including one in New England, which will supply parts.

The Field Mfg. Co., Owosso, Mich., is constructing 450 special motor truck bodies for the aircraft division of the United States Army, which when equipped will be traveling machine shops for the repair of airplanes. The bodies will be mounted on 5-ton trucks on each of which will be a 6000-lb. crane.

The Barley Motor Car Co., Kalamazoo, Mich., has purchased the plant of the States Motor Car Co., that city.

The Brisk Blast Co., Monroe, Mich., manufacturer of automobile accessories and airplane parts, has been reorganized with C. B. Southworth president; Charles McIntyre, vice-president and treasurer, and J. F. Meyer, secretary. The company moved from St. Louis.

The McLouth Shipbuilding Co., Marine City, Mich., has received a Government contract for 10 ocean-going tugs, the expenditure approximating $2,500,000. The hulls will be of wood and the upper works of steel. They are to be completely equipped at the plant.

W. C. Durant of the General Motors Co. has commenced the erection of a grey iron foundry at Saginaw, Mich. The first unit will cost $1,100,000 and employ 800 men. J. E. Manning is local manager.

The Essex Brass Corporation, Detroit, has been incorporated with capital stock of $100,000. The principal stockholders are Edwin C. Nagel of the Michigan Lubricator Co., Louis A. Banziger, Detroit Smelting Co., and John H. Qualman.

The Victor Screw Works, Detroit, successor to the McLean-Heames Co., has increased its capital stock from $250,000 to $500,000. George McLean is president; Frank H. Chapin, vice-president; Victor M. Gunderson, secretary, and Richard M. Heames, treasurer.

The Swedish Crucible Steel Co., Hamtramck, Mich., has commenced the construction of two new foundry buildings, 90 x 240 ft. and 45 x 240 ft., for the production of steel castings.

The Auto Mfg. & Engineering Co., Detroit, manufacturer of motor trucks, is said to be planning for the establishment of new works at Fort Wayne, Ind., and the removal of its present plant to that city.

A one-story power plant, 47 x 50 ft., will be erected by the Eaton Rapids Woolen Materials Co., Eaton Rapids, Mich.

The Buick Motor Car Co., Flint, Mich., is arranging for the erection of a one-story and basement extension, 70 x 148 ft., and a two-story addition to cost about $20,000.

Cleveland

CLEVELAND, Sept. 2.

New inquiry continues very plentiful. Automobile manufacturers not wholly engaged on Government work are taking on war orders as rapidly as possible to keep their plants in full operation after Jan. 1, and the change in production from passenger cars to essential work will necessitate the purchase of additional equipment. The Winton Motor Co., Cleveland, is inquiring for 25 machines and the Paige Motor Car Co., Detroit, has purchased 9 turret lathes and other machinery. Some inquiry is coming from the Detroit territory for equipment for toolrooms and airplane work. A large inquiry for bayonets is pending and will require the purchase of a round lot of milling machines. Henry Ford & Son, Dearborn, Mich., are receeiving bids on machinery for their new Hamilton, Ohio, tractor plant. The list covers general machine shop equipment, and it is understood that about 400 machines will be purchased. The Nickel Plate Railroad placed orders the past week for a planer, driving wheel lathe, slotter and a few engine lathes, and the American Shipbuilding Co. is closing on its recent list. This company purchased a 42-in. x 28-ft. heavy duty engine lathe from the Duplex Machinery Co., Cleveland, and is still in the market for 2 milling machines and a radial drill. A Dayton manufacturer placed $30,000 worth of tools in lathes, high speed drills, milling machines and shaper with a local machinery house to be used for making gun sights or range finders. The American Steel & Machinery Co., Mansfield, bought some additional equipment. The Government is planning to purchase additonal machinery for use in France and in this connection an inquiry for 8 turret lathes has come from the Engineer Depot. Other Government inquiries include 7 lathes; 30 ft. planer, 15 ft. between housings; 2 turret lathes; pipe machine for the Puget Sound Navy Yard, and 6 turret lathes for the Boston Navy Yard. The demand for automatic machinery continues very active.

The Naval Department will receive bids Sept. 24 for the following machine tools for the Washington Navy Yard: Three 5-ft. radial drills; three belt-driven hack saws; one universal grinder; six motor-driven bench grinders; four 36-in. vertical turret lathes; six 36-in. engine lathes; one 15-in. turret lathe; four water-tool grinders; four 12-in. crank slotters; six arbor presses; 22 48-in. lathes, 42 ft. long; 16 48-in. lathes, 70 ft. long; one 30 x 36-in. x 14 ft. milling machine; two boring machines with 48-in. swing and 73-ft. bed; two 48-in. variable speed lathes, and two automatic screw machines.

The Winton Motor Co., Cleveland, is inquiring for eight hand milling and five plain milling machines, five 20-in. drilling machines and seven high speed single spindle drilling machines.

The Scott-Fetzer Machine Co., Cleveland, has purchased a 12-in. crank slotting machine.

The Alten Foundry & Machine Works Co., Lancaster, Ohio, is planning the erection of an addition.

The Wellman-Seaver-Morgan Co., Cleveland, will erect a three-story building, 80 x 120 ft. in connection with its Akron, Ohio, plant for office purposes.

The James H. Herron Co., Cleveland, consulting engineer, will move its offices, research and testing laboratoriess Sept. 1 to enlarged quarters at 1360-1364 West Third Street.

The K & W Rubber Co., Ashland, Ohio, will move to Delaware, Ohio, where it will erect a factory, 50 x 300 ft.

The Van Dorn Iron Works Co., Cleveland, has taken out a permit for a machine shop, 80 x 100 ft.

The Ohio Brass Co. Mansfield, Ohio, has placed contract for the erection of a four-story addition 60 x 120 ft.

The Toledo Furnace Co., Toledo, Ohio, is planning the erection of several buildings including a machine shop, laboratory, storehouse, pipe shop and benzol laboratory. F. C. Warner, Hippodrome Building, Cleveland, is the architect.

It is reported that the New York Central and Baltimore & Ohio railroads have been authorized by the Railroad Administration to expend $168,000 for building car repair shops on the site formerly occupied by the Baltimore & Ohio shops in Sandusky, Ohio.

The Cleveland Twist Drill Co., Cleveland, has commenced the erection of a six-story concrete factory, 110 x 120 ft., for increasing the manufacturing facilities in its various departments. Some new machinery will be required.

The Aluminum Castings Co., Cleveland, will make further extensions to its Harvard Avenue plant to take care of Government work. A building, 120 x 260 ft., is nearing completion and contracts have been placed for an additional structure, 140 x 260 ft., of brick and steel, to be used as a core room. Another new building will be 150 x 460 ft.

The Van Dorn Electric Tool Co., Cleveland, will erect a two-story addition, 31 x 37 ft., to its machine shop.

The Doehler Die Castings Co., Toledo, Ohio, has commenced the erection of two extensions to be used largely for making airplane bearings and other war products. An addition to the machine shop will be 50 x 160 ft., four stories and basement, one floor of which will be used for the manufacture of aluminum die castings. The foundry extension will be 50 x 120 ft.

The Universal Auto Parts Co., Toledo, has been incorporated with a capital stock of $10,000 by Harry Levison and others.

The American Railway Signal Co., Fostoria, Ohio, has been incorporated with a capital stock of $100,000 to manufacture torpedoes, torches, etc., for signal purposes. A factory location has been secured. Glenn McClure, Clarence B. Brown and Otto Bimisderfer are interested.

The Gregory Rubber Co., Akron, Ohio, has acquired the plant of the Warren Steel Range Co., Warren, and will remove its business to that location.

The old plant of Sailer & Melvin, Massillon, Ohio, maker of plain and lock washers, was destroyed by fire a few days ago with a loss of about $5,000. The company recently purchased a new plant and had removed part of its machinery to the new quarters.

The H. G. Ferguson Co., 6523 Euclid Avenue, Cleveland, has been organized to do engineering and construction work, specializing on shops, factories and power houses. H. G. Ferguson, president, was formerly secretary of the Austin Co., Cleveland.

Cincinnati

CINCINNATI, Sept. 2.

Orders for machine tools from Eastern companies received lately embrace lathes, milling and shaping machines, but in many cases deliveries cannot be promised within three months. Foundries are making deliveries on castings more promptly than usual, but it remains to be seen whether this is only a temporary relief, as both pig iron and coke are difficult to obtain.

The labor shortage is curtailing production of machine tools in this section, although the local situation is probably better than in Springfield and Dayton, where there is a very acute shortage of both skilled and unskilled help. The employment of women in manufacturing plants is quite general, and on light work they are said to be entirely satisfactory.

War conditionss are sharply affecting building operations in Cincinnati. The estimated cost of new construction in August is far behind any previous similar period. Most of the permits taken out, however, were for plant additions. The building commissioner's report shows that in August, 1917, permits were issued for buildings costing $926,875, while in the corresponding month of this year they amounted to only $323,310.

The George B. Curd Co., Union Central Building, Cincinnati, which recently purchased the factory of the F. W. Niebling Co., in Norwood, advises that the plant is now in full operation. It makes a specialty of building cars and repairing second-hand railroad equipment.

The A. V. Carroll Machine Tool Co., Cincinnati, is now operating its new plant in Norwood suburb. It is building lathes and will install considerable additional equipment at an early date.

The Procter & Gamble Co., Cincinnati, will build an addition to its power plant estimated to cost $65,000.

The Block Engineering & Storage Battery Co., Cincinnati, has been incorporated with $3,000 capital stock by Ralph Block and others.

The Republic Truck Co., 127 East McMicken Street, Cincinnati, has increased its capital stock from $50,000 to $100,000.

It is reported that the Niles Tool Works Co., Hamilton, Ohio, contemplates making an addition to its plant at an early date. Its new office building will be ready for occupancy by Nov. 1.

The Dayton Castings Co., Dayton, Ohio, has increased its capital stock from $15,000 to $50,000. It is stated that the increase was made to care for enlarged activities due to war work.

The American Spark Plug Co., Dayton, has been incorporated with $25,000 capital stock by B. F. Weaver, J. E. Martin and others. Nothing is yet known as to manufacturing plans.

The Columbus McKinnon Chain Co., Columbus, Ohio, recently received a large war contract and is adding equipment in its plant.

The Superior Foundry Co.'s plant at Hamilton, Ohio, was damaged by fire last week. No interruptions to its business resulted.

It is reported that the Baltimore & Ohio Railroad will build a roundhouse and repair shop at Columbus, Ohio. No confirmation can be obtained from local officials.

The Central South

LOUISVILLE, Sept. 2.

Local metal-working plants are busy, several good contracts having been obtained through the War Industries Board.

The War Department will consolidate the various motor and truck departments at Camp Zachary Taylor, Louisville, and equipped a shop to handle repairs.

The W. T. Adams Broom Co., Louisville, will rebuild its plant which was destroyed by fire with a loss of about $20,000. Most of the machinery was wrecked.

The Laib Co., Louisville, manufacturer and jobber of plumbing goods, mining machinery, steam equipment, etc., is now featuring pumps of all kinds, acting as representative of three large pump manufacturers of the country.

The Southern Machinery Co., Knoxville, is in the market for a 6-in. discharge, low-service tank pump.

The Elkhorn-Jellico Coal Co., Whitesburg, Ky., will build a power plant on land recently acquired by M. K. Marlow and others.

O. C. Eavans, Greenville, Ky., is in the market for electrical equipment for shaft mine.

The Centertown Coal Co., Centertown, Ky., is in the market for a 250-kw. 250-volt direct current generator set, direct connected to engine.

The Durham Coal & Iron Co., Chattanooga, wants prices on a double acting 300-hp., single-cylinder, center crank steam engine, with 20 x 84 in. flywheel, and one 80-hp., marine or locomotive type boiler.

The Farris Coal Co., East Bernsteadt, Ky., wants prices on a 12 to 18-hp. reversible engine with drum capacity of 2000 ft.

Thomas L. Barrett, 123 Third Street, Louisville, is asking prices for a 100 kw. 2300 volt, three phase, 60 cycle generator, preferably with belt drive.

Henry Loeb & Co., Memphis, Tenn., desire a second-hand internal fire locomotive type or Scotch marine boiler, 100 to 150-hp., with minimum pressure of 110 lb.

St. Louis

ST. LOUIS, Sept. 2.

The Schultz Belting Co., St. Louis, has acquired an additional 165 ft. of frontage on which it will erect an addition to its plant.

The Oliver Electric & Manufacturing Co., St. Louis, has begun construction on its new plant on a site 187 x 200 ft., recently acquired.

The East Side Foundry & Machine Co., East St. Louis, Ill., E. T. Rhodes, Belleville, Ill., and others interested, has acquired a site and will erect a plant to specialize in semi-steel and gray iron castings.

The Lincoln Forge & Steel Co., 3781 Sievers Lane, St. Louis, has let contract to William J. Beattie, Columbia Building, for the construction of a machine shop, 80 x 121 ft., to cost $9,000.

The Solid Steel Scissors Co., Fort Smith, Ark., has commenced the erection of an addition to its plant. It is devoting a portion of its output to Government contracts and plans to bring the production up to 250 dozen scissors per day.

The American Mfg. Co., South Eleventh Street, St. Louis, is building a new one-story power plant, 50 x 90 ft., at East St. Louis, Ill., to cost $40,000.

Texas

AUSTIN, Aug. 31.

The Gulf Pipe Line Co. of Beaumont will build a pipe line from the oil field at Ranger to connect with its trunk pipe line at Forth Worth.

The Marshall & East Texas Railroad has sold the southern end of its line, extending 20 miles from Marshall to Elysian Fields, to the Watterman Lumber Co., Marshall. It recently purchased 90,000 acres adjacent to this road and will build mills to manufacture the timber into lumber.

The Coggin Gin Co., McKinney, has been incorporated with a capital stock of $20,000, and will build a cotton gin. J. H. Ferguson is a stockholder.

The Independent Ice & Cold Storage Co., Mercedes, has been incorporated with a capital stock of $40,000. M. G. Crume is a stockholder.

The Transcontinental Petroleum Co., a subsidiary of the Standard Oil Co., will lay a third pipe line across the Panuco River from Las Matillas to its loading station near Tampico, Mexico.

The Pacific Northwest

SEATTLE, Aug. 28.

Manufacturing plants throughout the Northwest are rushed with work, and plants equipped to turn out machinery of any kind are operating at capacity. The drain of the shipyards and harvest season has caused a serious shortage of unskilled labor. The response of business men to the appeal of the local federal director of labor for additional workers in the shipyards has been prompt, but it is estimated that at least 1500 more men are needed to maintain the high rate of speed of the past few months.

The Puget Sound Sheet Metal Works, Seattle, plans the construction of a one-story foundry, 90 x 200 ft., costing about $12,000.

The Concrete Craft Corporations, Seattle, has been incorporated by G. E. Kastengrew, Israel Nelson, Louis Rolfe, Jeremiah Miller and C. E. Hogberg, with a capital stock of $1,000,000. Plans have not been announced.

The plant of the United States Steel Co., Everett, Wash is nearly completed, and is expected to be ready fc operation about Nov. 1. The main building is 300 ft. long, 60 ft. wide and 32 ft. high. One side will be devoted to furnace rooms, machine shops and electric storage plant. A large traveling electric crane will be installed.

The Brinkley Supply Co., 546 First Avenue South, Seattle, will erect a foundry at 651 Alaska Street. Plans have not been completed.

The Northwest Motor Co., Seattle, recently awarded contract for the construction of a two-story foundry, 100 x 200 ft., at 6803 Fox Avenue, to cost $16,000.

The Salmon Bay Foundry, Seattle, will build a heavy-timbered, two-story foundry, 40 x 140 ft., to cost $15,000. S. E. Sonnichsen, architect, is preparing plans.

C. L. Glasgow, New York, represented in Seattle by J. R. Nevins, architect, 1708 Hoge Building, is having plans prepared for a one-story building, 41 x 175 ft., at East Marginal Way and West Spokane Street, for the manufacture of oxygen gas and welding appliances, at a cost of $30,000.

The Lebam Mills & Timber Co., South Lebam, Wash., will begin work shortly on the construction of a new mill to replace the one destroyed by fire some time ago. It will have a daily capacity of 75,000. A planing mill will also be erected.

The St. Johns plant of the American Marine Iron Works, Portland, has been incorporated with the following directors: S. F. Wilson, M. L. Jones, T. H. Beverly, A. M. Cannon and Carl Jones. It has acquired two blocks on the Willamette River at the foot of Richmond Street and a foundry and machine shop are being equipped.

The Western Foundry Co., Portland, has been incorporated with a capital of $5,000, by R. E. Huffschmidt, Ralph T. Montag and John Van Zante.

The Northwest Steel Co., Portland, has acquired five acres adjoining its plant on which it will erect a machine shop, warehouse and fitting out dock.

The Grays Harbor Iron & Machinery Works, Hoquaim, has been incorporated with a capital of $40,000 by M. T. Thorpe, C. I. Bell, P. H. Hoonan and C. H. Jennings.

The American Foundry Co., Seattle, has been incorporated with a capital of $50,000 by S. K. Prescott, E. L. Prescott, E. S. Johnson, H. A. Thurlow and J. P. Jensen.

The Pacific Iron Works, Seattle, is installing equipment for the manufacture of heavy duty gas engines up to 200 hp.

The Robinson Machine Works, Seattle, is adding gear cutting equipment to its machine shop.

The Long Beach Shipbuilding Co., Long Beach, is arranging for the construction of eight steel vessels at its plant for the Emergency Fleet Corporation.

The State Railroad Commission has granted the Southern California Edison Co., Los Angeles, permission to provide an appropriation of $223,793 for extensions to its hydro-electric power plants in the Big Creek section, with further fund of $842,000 for the construction of two additional power plants below the present Nos. 1 and 2 generating stations at Big Creek.

The French-American Shipbuilding Corporation, Los Angeles, has been incorporated with a capital of $2,000,000 to build vessels. E. Roy Lathrop, Howell Baker, Floyd M. Hinshaw and J. A. Russell, Los Angeles, are the incorporators.

Canada

TORONTO, Sept. 2.

Machine-tool and supply dealers report an active demand. Some shell forgings in the United States have been much harder than those turned out in the Dominion and as a consequence are harder on machine tools, especially high-speed. There is a very good demand for the latter and stocks are quite depleted at some points. In Montreal a fair demand exists for tools for toolroom work and there is considerable activity in second-hand equipment.

Electrics, Ltd., Montreal, has been incorporated with a capital stock of $50,000 by Gustavus H. Rainville, Charles B. Walsh, Stephen H. Wiggett and others to manufacture electric, magnetic, railroad and other equipment.

The Brown Corporation, pulp and paper manufacturer, with mills in Canada and the United States, is about to start work on a paper mill at La Tuque, Que., to cost $20,000,000.

The Denby Motor Truck Co., Detroit, Mich., has completed plans for the erection of a manufacturing plant at Chatham, Ont. Temporary offices will be opened immediately and the company expects to commence manufacturing trucks in about 30 days. The company has a capital stock of $200,000.

Les Minoteres Electriques de Metabetchouan, Limited, Metabetchouan, Que., has been incorporated with a capital stock of $99,900 by A. Tremblay, E. Gagne, O. Tremblay and others to generate light, heat and power, and to manufacture electrical machinery and equipment.

The plant owned by the Steel Co. of Canada, Swansea, Ont., was damaged by fire with a loss of $4,000.

The pumping station owned by the Tillsonburg Waterworks Co., Tillsonburg, Ont., was destroyed by fire with a loss of $75,000. It will be rebuilt.

The Canada Metal Co., Fraser Avenue, Toronto, is building an addition to its munition plant to cost $5,500.

The Canadian Ferro Alloys Co., Shawinigan Falls, Que., has let the contract to G. A. Gruninger, 155 Laviolette Street, Three Rivers, Que., for an addition to its plant to cost $35,000.

The Miller Tire Co., Ltd., Winnipeg, has been incorporated with a capital stock of $40,000 by H. G. Middleton, H. A. and C. E. Middleton, and others, all of Winnipeg, to manufacture rubber goods, automobile tires, etc.

The Winnipeg Piano Co., Ltd., Winnipeg, has been incorporated with a capital stock of $600,000, by Arthur H. Grassby, William A. Smith, Frederick W. Louthood and others of Winnipeg, to manufacture pianos, organs, gramophones, musical instruments, etc.

The Imperial Statistical Office of Germany has collected data for comparing the extent to which wages of adult workers in industrial establishments have risen above the level in the early part of 1914, says the London *Iron and Coal Trades Review*. The data are based on returns from 374 industrial companies and show for each of the last two full weeks of March and September in each of the years 1914, 1915, 1916, and 1917, the total number of days worked, the length of the working day (exclusive of intervals for meals and overtime), and the aggregate wages earned by adults of each sex. If the average sum earned for a day's work in March, 1914, be taken as equal to 100, then the corresponding figure for September, 1917, is found to have been 213 for male and 275 for female workers in the metal industries, 203 and 214 respectively in the engineering industries, and 242 and 225 respectively in the electrical industries.